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COMPUTERWORLD

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Latest DEC benchmark points out weaknesses in using Debit/Credit measures as a standard. Page 25.

Extended Edition upgrade due this spring is expected to beef up the database management component of the high-end OS/2 version. Page 120.

What 3090 S delays?

Survey finds delivery woes few and far between

BY ROSEMARY HAMILTON
CW STAFF

While IBM blamed 3090 S model shipment delays as the primary reason for an expected drop in first-quarter earnings, a random survey of user sites last week uncovered few that had been affected by delays.

Of 14 3090 sites contacted, two users had shipment dates postponed to late 1989. Two user sites had their delivery dates moved up from April to this month. Four others received 3090 S models in the first quarter, as planned. Another site said its system was scheduled to arrive in early April and that the plan has not been changed. Other users who had planned to install a 3090 S model later in the year said they did not expect any impact from the shipment delays.

IBM said last week that the first-quarter delays would cause shipment disruptions for several months and that the company would be fully back on track by the third quarter.

Seesaw effect

Some observers speculated that S model demand is not as high as IBM had expected. Comdisco, Inc. reported a strong demand for E models and said interest in newer S models is "steady, but nothing to put in the record book."

"I think the demand for E models is higher than expected, and that may be impacting the demand for S models," said George DiNardo, executive vice-president at Mellon Bank Corp. in Pittsburgh.

An IBM spokesman stressed that the shipment delays [CW, March 20] involved only a small number of 3090 S models and that the unspecified chip problem, which caused the backup, is completely resolved. He noted that only a few missed sales of big-ticket items like the 3090 — which can cost more than $10 million — are capable of bringing down quarterly results.

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Merrill Lynch may hand off net control

BY ELISABETH HORWITT
CW STAFF

NEW YORK — Merrill Lynch & Co. is considering whether to relinquish control and even ownership of its network facilities to either MCI Communications Corp. or AT&T.

The investment giant has put out a request for proposals for a contract "to turn over our voice and data network to a vendor and let someone else provide network services and management," said DuWayne Peterson, the company's executive vice-president of operations/systems and telecommunications.

The contract's only real ceiling is the company's $400 million annual telecommunications budget, Peterson said, but "it's unlikely to go anywhere near that figure." One major goal of the contract is to slash that bud-

Continued on page 6

Maintenance hikes, deals stir CA users

BY ROBERT MORAN
CW STAFF

Some Computer Associates International, Inc. customers who have recently come up for maintenance contract renewal are reeling from unanticipated fee hikes.

Customers of companies acquired by CA claimed that it gave them no written notification of maintenance price hikes of as much as 50%. Instead, they said that the sales force is using the threat of price increases to strong-arm them into acquiring CA software they do not want.

While some customers calmly viewed the situation as a normal process in the software industry (see story page 8), others said they are incensed at the manner in which CA salesmen are offering to lock in current maintenance levels if customers purchase additional products.

Sanjay Kumar, CA's vice-president of product planning, confirmed last week that CA account representatives have been informing customers of changes in maintenance-pricing policies for systems and information products. Kumar maintained that the company is converting pricing schemes of acquired

Continued on page 8

Sliding scale

Depending on processor size, former Applied Data Research customers may find maintenance fees declining or climbing under Computer Associates' tiered pricing

Former ADR package	*Maintenance fee (per year after first year)*	
	Old (under ADR)	*New (under CA)*
Datacom/DB	$13,800-$20,550	$8,700-$24,750
Ideal	$11,850-$17,400	$7,500-$20,850
Librarian	$4,500-$11,880	$2,880-$17,820
Roscoe	$11,340	$11,340-$17,100

SOURCE: DATA SOURCES AND COMPUTER ASSOCIATES INTERNATIONAL, INC.
CW CHART: FRANK C. O'CONNELL

Loophole lets states copy without risk

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Having failed in the U.S. Supreme Court last week, the software industry is turning to Congress for help in closing a legal loophole that allows state agencies and universities to copy software with impunity.

The Supreme Court let stand a lower-court ruling in *BV Engineering* v. *University of California at Los Angeles* that said the company could not sue UCLA because the U.S. Constitution makes state-run institutions immune from copyright-infringement lawsuits.

With court appeals exhausted, "we have to redouble our efforts and make sure we get legislation through Congress," said Kenneth A. Wasch, executive director of the Software Publishers Association, located here.

The SPA and ADAPSO, the computer software and services industry association, have endorsed House and Senate bills specifying that states are subject to copyright-infringement suits.

Without such legislation, copyright owners are worried that the BV Engineering decision will allow widespread, uncontrollable copying of their works without remuneration.

"The longer the problem goes uncorrected, the greater the problem will be," Wasch said. "Already, we get scattered reports of state universities and agencies that are buying one copy of software for every two computers."

BV Engineering is a small Riverside, Calif.-based organization that sold a set of seven electrical engineering programs to UCLA.

The firm sued for damages in 1986 after discovering that UCLA had made three copies of each program and 10 copies of each user manual.

The legal problem stems from the Constitution's 11th

Continued on page 6

Shine on

Windows users continue to make purchases despite raging Apple-Microsoft legal confrontation. Page 121.

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Quotable

"Salespeople are doing anything and everything to make it a successful quarter, and maybe there are some that are going overboard."

SANJAY KUMAR
CA

Referring to complaints that CA customers are being pressured. See story page 1.

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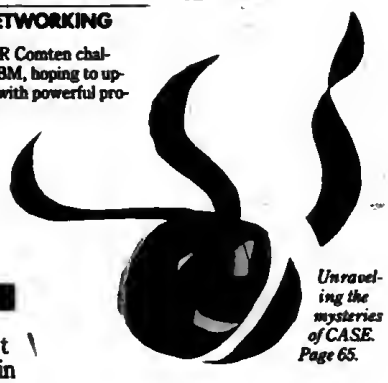
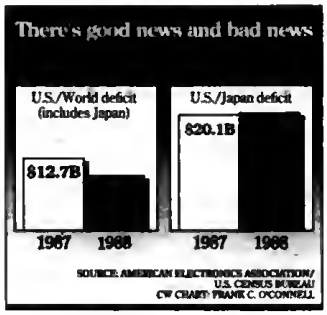


Unraveling the mysteries of CASE. Page 65.

UPDATE

HERE'S a peek at the work force in the year 2000, culled from several sources: The demand for skilled labor far outstrips supply; MIS help-wanted shingles sprout like wildflowers; spoiled-rotten second-generation yuppies laugh at company loyalty, insist on flexible, more expensive compensation packages and concern themselves more with flextime than uptime; and the labor pool is aging — fast. If you're around and hiring then, take two aspirins and wash 'em down with Geritol.



EXECUTIVE BRIEFING

■ **More than a product, more than a concept,** CASE is becoming easier for managers to understand with its new standard definitions. However, CASE paybacks still can't be measured by basic business accounting. Users cite ease of documentation as the biggest benefit. Page 65.

■ **TGIF took on new meaning** for the kings of the computer industry, IBM and DEC. With stock markets closed for Good Friday, the day marked the welcome end of a tough week for the companies. IBM officials spent much of the week downplaying the chip-supply problem that led to some delays in its 3090 mainframe deliveries, page 1. That left IBM Chairman John Akers to explain the resulting projections of lower quarterly earnings and to discount fears that the computer industry faces severe problems, page 120. Meanwhile, DEC's continued shifting of its product lines may be to blame for slow domestic sales and, thus, a drop of more than $16, or about 15% in the value of a DEC share in eight days, page 120.

■ **The threat of maintenance price hikes** is being used by Computer Associates sales representatives to strong-arm customers into buying more CA software, according to charges aired by MIS managers. Page 1.

■ **Apple's Macintosh has grown** from seeds planted by users who brought it in through back doors. The machine has reached for the sky as a general-purpose system and is making progress as a workstation in aerospace firms. Page 41.

■ **Using ATMs for information,** Boston College students find that teller machines can do more than dispense pocket money. The school is using the machines to provide students with their personal records. Page 29.

■ **Economies, bandwidth growth potential** and the security of redundancy were behind a financial information services firm's decision to move its communications onto a high-speed fiber-optic network spanning metropolitan New York. Page 56.

■ **Emphasizing togetherness,** the Society for Information Management opened nominations for its annual Partners in Leadership Awards. The awards honor IS and business leaders who combine to give their firms an information edge. Page 59.

■ **Despite a $100 price hike** for Lotus' undelivered 1-2-3 Release 3.0, the corporate world may have few alternatives to paying. Managers say they are locked into Lotus, although there are rumblings that Microsoft's Excel is beginning to look good. Page 4.

■ **How well is your VM system performing lately?** If it's getting bogged down, ask your systems programmers or technical support specialists about it. Some savvy pros have already come up with ways to improve the IBM operating system's performance. Their tips start on page 87.

■ **Once an IBM bastion,** the service market for IBM 3090 mainframes is showing cracks. A handful of 3090 shops are opting for third-party maintenance programs such as those offered by Control Data. Page 29.

■ **Yet another crack** in IBM's walls opened wide enough for the Pick operating system to slip in from its home in the midrange world. McDonnell Douglas Information Systems announced plans to introduce Pick into IBM MVS mainframe environments. Page 25.

■ **The pace of change** in IS organizations calls for professionals to take an active stance toward their continuing education. Five questions can help them determine what they need to learn and where to find appropriate resources. Page 117.

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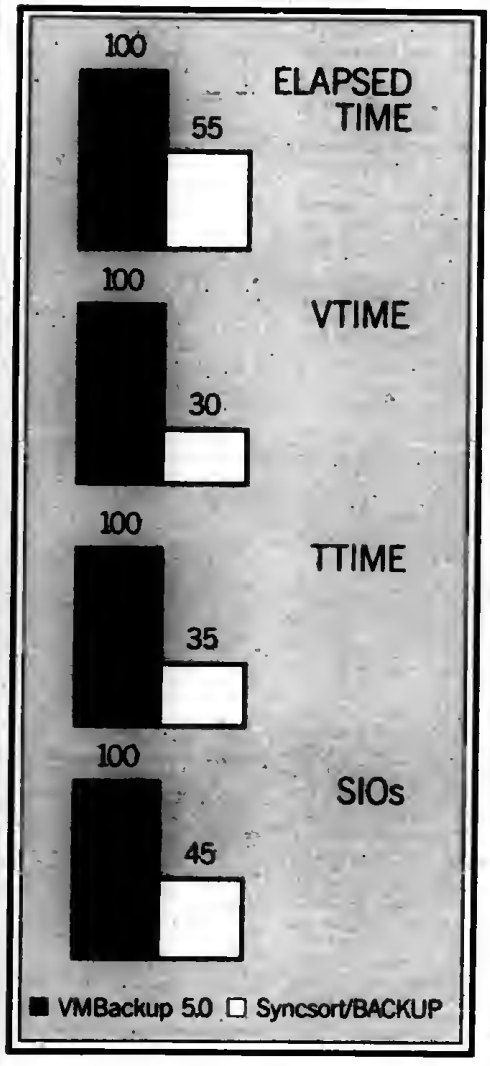

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Lotus bumps up Release 3 cost

BY DOUGLAS BARNEY
CW STAFF

PALM SPRINGS, Calif. — With its product still months away from shipping, Lotus Development Corp. last week added $100 to the price of 1-2-3 Release 3.0, a move sure to heighten the tensions of an already wary user base.

Besides announcing the price hike of that unreleased product to $595, Lotus also used the PC Forum Conference here to formally unveil 1-2-3 Release 2.2 and detail previously undisclosed features of 1-2-3 Release 3.0, including its use of DOS Extender technology [CW, March 20].

Most of Lotus' customer base has stuck with 1-2-3 despite product delays and a rash of newcomer products that sometimes offer superior features. Observers also expect that base to bite the high-price bullet, regardless of the pain involved.

Some users have been waiting for months, if not years, for Lotus to show its spreadsheet hand, and their frustration is starting to show. "If Lotus raises the price or misses another ship date, we are going to look very closely at Microsoft Excel," said a computer manager at a Fortune 500 insurance firm.

The personal computer staff at Aluminum Company of America said it feels locked into the Lotus way of spreadsheet life. "It will bother us, but if the product continues to be as good or better than it is right now, we will probably stick with it," said Linda Baily, PC coordinator for the firm's Tennessee facilities.

It is this type of entrenchment in corporate America that has kept Lotus safe from an astounding array of competitors. "The big issue is the fact that it is the corporate standard. It might be worth another hundred bucks not to change the standard," said Katy Kuryla, group project manager at Ryder Truck Rental, Inc.

The Lotus pricing maneuver is the exact opposite of Microsoft Corp.'s strategy, which offers an enormous array of special deals, including one that provides Microsoft Excel to 1-2-3 users for $134. Sources in the direct-sales trenches say that Microsoft is sometimes offering Excel free in exchange for a 1-2-3 program disk.

JOHN OWENS

Lotus' King

Lotus Senior Vice-President Frank King defended the price increase, pointing to a bevy of new features such as three-dimensional worksheets not found in today's version. He also emphasized the fact that the increase does not kick in until early next year. "We wanted to be upfront," King said.

The $595 price is also balanced by the the firm's new server pricing scheme. Under this system, each user on the server pays half price, or $295, for the use of 1-2-3 along with a full set of documentation.

Release 2.2, which is set for fall delivery, will sell for $495. It includes file linking, minimal recalculation, an Undo key, search and replace and improved graphics. The system will also reportedly include Allways, a spreadsheet publishing system that Lotus acquired from Funk Software, Inc.

Release 3.0 uses DOS Extender technology from Rational Systems, Inc. This allows applications to address a full 16M bytes of random-access memory without OS/2.

Shift seen in Lotus database plans

BY DOUGLAS BARNEY
CW STAFF

CAMBRIDGE, Mass. — A major shift in the personal computer database wars will occur later this year when Lotus Development Corp. opts to sell a server from Oracle Corp.

Oracle, with its large installed applications base, won out over current Lotus partner Gupta Technologies, Inc., a small Menlo Park, Calif., firm currently shipping database server technology for MS-DOS and OS/2, several sources said.

Gupta founder Umang Gupta said he had no knowledge of the Lotus decision but was confident that the Lotus applications tools would still work with the Gupta database engine. Lotus officials declined to comment.

The unshipped Oracle server is based on the transaction-oriented Oracle 6.0 and will run under OS/2. "These guys have been hot and heavy," said one source, commenting on the long and complex negotiations that led to the agreement.

An Oracle tester said the OS/2 Server was in good shape and would likely ship in a couple of months. Others, however, pointing to bugs in the Digital Equipment Corp. VAX version of Oracle 6.0, predicted a late summer ship date at best.

It is the OS/2 platform, however, that would position Lotus and Oracle squarely against the alliance of Ashton-Tate Corp., Microsoft Corp. and Sybase, Inc. These three firms are putting the final touches on SQL Server, also for OS/2.

Observers said they believe that Lotus teamed up with Oracle after numerous benchmarks and the realization that Oracle's enormous marketing clout would help in the battle against SQL Server. According to one source, talks became more earnest early this year when Lotus asked Oracle to prove that tools such as 1-2-3 Release 3.0 would run against the Oracle server. Given Oracle's poor track record for delivering products on time, Lotus also requested assurances that the server would ship when the Lotus products are ready this summer.

Lotus/DBMS, announced approximately two years ago, was originally to be a set of graphical tools built for the Gupta database engine. Because those tools are far from shipping, Lotus decided to accelerate its push. Soon after 1-2-3 Release 3.0 ships with the Blueprint communications specification and the Lotus Extended Applications Facility programming language, Lotus will roll out the Oracle server, sources said. Although Lotus is expected to sell only the Oracle server, its applications will support other back-end products, including IBM's OS/2 Extended Edition Data Manager and, if need be, SQL Server.

The Lotus-Microsoft battle will also be waged on the communications front. While Lotus polishes Blueprint, a communications specification for transporting data between applications and database management systems, Microsoft is working with Sybase on Openserver, a method of communications that glosses over differences between SQL syntaxes, sources said.

Stratus changes course, picks Intel I860 RISC chip

BY JAMES DALY
CW STAFF

MARLBORO, Mass. — Stratus Computer, Inc. did an abrupt technological about-face last week, announcing it would base a new series of high-performance reduced instruction set computing systems on the recently introduced Intel Corp. I860 RISC microprocessor.

The early victory for the much-ballyhooed Intel chip — which was unveiled less than four weeks ago [CW, March 6] — came 11 months after Stratus announced plans to build its machines around Motorola, Inc.'s 88000 RISC chip. The planned I860-based systems are expected in the early 1990s.

Intel and Motorola "are both excellent technologies, but we see a large segment of the market [moving] toward the I860," said Pam Brown, a spokeswoman for the fault-tolerant systems maker. "By having a compatible architecture with these other vendors, we see more opportunities . . . to take advantage of the software that is being developed for the I860."

Two major Stratus OEMs — IBM and Ing. C. Olivetti & Co. — have already endorsed Intel's chip, Brown added, and Unisys Corp., AT&T and Prime Computer, Inc. have expressed interest. There has also been speculation that IBM may design RISC workstations based on the I860.

The fan club forming around the 64-bit Intel chip stems from its power and expected price. The I860, which squeezes more than a million transistors on one chip, will reportedly provide processing and graphics power equivalent to that found in high-end workstations but at a much lower price — about $750 in quantities of 1,000 by year's end. The chip will reportedly be available in production quantities in the third quarter.

Stratus is not abandoning Motorola completely. "Our RISC-based systems will also include large numbers of Motorola 68000 microprocessors in the I/O and controller subsystems," said Robert Freiburghouse, senior vice-president of engineering at Stratus.

COMPUTERWORLD

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	Los Angeles	Mar 14fm Apr 20af Apr 25g
	Ontario	Mar 21fm
	Redwood City	Apr 27g
	Sacramento	Mar 21f
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	Rochester	Apr 13p
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WA	Seattle	Mar 29ar
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WI	Milwaukee	Mar 8f Apr 26r

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f Oracle Financials
m Computer Integrated Manufacturing (CIM)
p PC Workgroup Solutions
r Application Tools
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NEWS SHORTS

Boeing opts for DEC over MAP

Digital Equipment Corp. is slated to put together Boeing Co.'s largest computer-integrated manufacturing installation, having won a two-year contract estimated at $50 million. The system will be based on Decnet, even though Boeing has been a proponent of the Manufacturing Automation Protocol (MAP). MAP requires expensive customization, and Boeing wanted to use proven products when possible, one subcontractor said.

Solbourne hits desktop

Solbourne Computer, Inc. introduced what it is billing as the first Sun Microsystems, Inc.-compatible desktop workstations last week. Solbourne, a maker of deskside Sun-compatible systems, unveiled the Series 4/500. The system reportedly is binary and network-compatible with the Sun-4, can attain 9.5 million instructions per second (MIPS) and can be upgraded to 17 MIPS with a second processor.

Credit deal sealed

TRW, Inc. completed its acquisition of Dallas-based Chilton Corp. last week in a $330 million deal that creates the largest consumer credit data service in the U.S. The merger, completed after the federal government approved an antitrust settlement (CW, March 20), cuts the industry down to three nationwide credit information networks: TRW's Credit Data Division in Orange, Calif., Equifax, Inc. in Atlanta and Trans Union Credit Information Co. in Chicago.

Sun and Cray cooperate

The technical computing market got a shot in the arm last week when Sun and Cray Research, Inc. announced a development and marketing pact under which Sun workstations will be integrated with Cray supercomputers. The pair-off has already borne fruit in the form of the Cray FEI-3 channel interface, which provides high-speed data transfer capabilities between Sun and Cray machines. In a related announcement, Mountain View, Calif.-based Sun unveiled its 58TE terminal emulation software, which allows Sun workstations to emulate the IBM 5080 graphics terminal. The package is priced from $30,000 to $50,000.

Congress weighs permanent break

Bills making the 20% research and development tax credit a permanent part of the federal tax code were introduced in the U.S. House of Representatives and Senate last week. The tax credit is scheduled to expire this year. The extension bills, cosponsored by 20 senators and 23 members of the House, were praised by the Computer and Business Equipment Manufacturers Association, the American Electronics Association and the Council on Research and Technology.

Optical storage cited

Electronics giant Matsushita Electric Industrial Co. Ltd., producer of Panasonic products, announced the commercialization of a breakthrough high-performance erasable optical disk that will debut this week in Japan. The 3½-in., 280M-byte removable disk makes use of phase change technology, which allows users to directly overwrite data. The ability to erase and write in one pass rather than two dramatically speeds throughput — a bottleneck of optical technology — and provides an average data access time of 42 msec, Matsushita claimed.

OSF expands

To keep up with its surging membership — currently at 110 — the Open Software Foundation (OSF) has established regional offices on the West Coast and in the Washington, D.C., area. According to an OSF spokeswoman, the offices were created to carry out membership services, which include communications and education as well as recruitment of new members. The offices — located in Herndon, Va., and Mountain View, Calif. — are staffed and in operation.

First Cray goes to Smithsonian

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The Cray-1 supercomputer, introduced in 1967 and slowly being phased out by Cray Research, Inc., has finally become a museum piece.

Cray recently donated one of the nation's first supercomputers to the Smithsonian Institution. Beginning May 12, it will be on display at the ever-popular National Air and Space Museum as part of a new gallery illustrating the use of computers in the aerospace industry, Smithsonian officials said.

The Cray-1A, Serial No. 14, was relinquished by the National Center for Atmospheric Research in Boulder, Colo., according to Cray spokesman Ken Jopp in Minneapolis. He said the unit was transported by truck to Cray's plant in Chippewa Falls, Wis., and then on to the Smithsonian in Washington, D.C., which is sometimes referred to as the "nation's attic."

Actually, the attic may be creaking a bit. Jopp said the museum had a little trouble getting the supercomputer up to the second-floor exhibit space and had to shore up the floor to hold its weight.

The new museum gallery, called "Beyond the Limits: Flight Enters the Computer Age," will trace the convergence of the computer and aerospace industries from the 1940s. For example, one exhibit covers the role of the Apollo guidance computer in the effort to land a man on the moon.

Cray-1A unit *now at Smithsonian*

Super exhibit

The Cray-1A will be part of an exhibit explaining how supercomputers were used to design Grumman Corp.'s X-29 aircraft, officials said, which is known for its radical, forward-sweeping wings.

Each exhibit will include at least one hands-on interactive computer terminal so that visitors can see the kinds of tasks that computers perform, including flight simulation and computer-aided design and manufacturing.

The aerospace exhibit is not related to the Smithsonian's forthcoming "Information Revolution" exhibit on computers, which is scheduled to open in 1990 at the National Museum of American History.

Merrill Lynch

FROM PAGE 1

get by as much as $30 million.

The RFP represents the firm's search for a way to stop being its own telephone company, Peterson said: "AT&T and MCI can bring an economy of scale and a deeper skill base than we can ever hire. Good telecommunications people are harder and harder to find now, because the job is more complex."

Both AT&T and MCI are bringing subcontractors to the bidding, Peterson said. AT&T is teaming up with Computer Sciences Corp., and MCI is calling on IBM and Electronic Data Systems, Inc., among others.

But while Merrill Lynch "likes the idea of a one-source integrator," Peterson explained that the company also has reservations about surrendering network control and management to an outside vendor: "The question is how to protect yourself, how to make sure you get service of the quality, response time and cost-effectiveness you would get if you did it yourself."

This dilemma has long faced Merrill Lynch, according to Jeffrey Held, a group manager of Ernst & Whinney network consulting subsidiary Network Strategies, Inc. "Their business is dependent on networking, but they are also bottom-line oriented, and staffing and managing a [private] network is an expensive nightmare, especially in Manhattan," he said.

The investment firm hopes that its RFP will bring in a solution that combines the cost-savings of a public switched network with the control, monitoring and billing features of a private network, Peterson noted. While the company hopes to turn over maintenance and service tasks to a carrier, its own telecommunications staff will continue to have "intense involvement" to ensure reliability, he said.

The firm also wants the winning contractor to buy some of its telecommunications equipment such as T1 switches and two giant AT&T 5ESS switches, Peterson said. This would free some of the capital Merrill Lynch has tied up in telecommunications equipment and still let the company lease back the facilities it needs, Held explained.

This is not the first time Merrill Lynch has considered turning its network over to a vendor, Held said. "When we worked with them on the design of their first backbone network," he said, "they invited AT&T, Contel ASC and Northern Telecom to take on the management." The company decided then that no vendor had the tools or services to do the job, he noted.

Even now, according to Held, there is a strong possibility that Merrill Lynch will decide to go with an in-house solution. "If they go with a vendor proposal, it seems to me there would be a significant bloodletting internally, so the internal people have put together a proposal as well."

That proposal may well fly, Held added: "You always worry whether the vendor will respond with the same intensity you would if something breaks."

Loophole

FROM PAGE 1

Amendment, which is generally interpreted to provide state governments with immunity from lawsuits.

Ruling in the BV Engineering case last year, the U.S. Court of Appeals for the 9th Circuit decided the Copyright Act of 1976 failed to use "unequivocal and specific language" that would exempt copyright suits from the 11th Amendment's state-immunity clause.

No question

The loophole-closing bills, which were designed to make it unmistakably clear that states will be held liable for copyright violations, were introduced by Rep. Robert W. Kastenmeier (D-Wis.) and Sen. Dennis DeConcini (D-Ariz.). Sources said a Senate hearing on the proposed legislation is scheduled to be held May 17.

The legislation is also being supported by the U.S. Copyright Office, which declared that although Congress originally intended to make states liable in these cases, a clarifying amendment is needed to resolve the uncertainty and remedy the situation in question.

As of press time, there was no opposition presented to the loophole-closing bills. "The legislation should go through the Congress easily," said Esther Roditti Schachter, a computer law expert based in New York, "because there is no countervailing public policy."

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CA users

CONTINUED FROM PAGE 1

products, such as those from Applied Data Research, Inc. (ADR) and Ucccl Corp., to comply with those established previously for existing CA systems and information products.

CA, in effect, is eliminating site-license-based cost structures and replacing them with a tiered pricing structure based on IBM classifications of different-size processors. Kumar said, however, that the "company is not doing across-the-board maintenance increases."

CA has issued no formal advisory to customers, relying on its account managers to deliver the news to their individual customers.

Several customers who have been informed of the changes told *Computerworld* that the policy was presented in a manner that caused them to feel they had been pressured to buy software if they wanted to lock in lower maintenance rates.

Arm-twisting

John Showers, manager of technical support at Diamond Shamrock Corp. in San Antonio, said that a CA salesman, after hinting that CA would raise maintenance prices 40% to 50%, said he could lock in maintenance at today's prices if Shower bought additional software for a specific price. "They tried to twist our arm to buy something by raising the prices," Shower said.

Kumar denied company salesmen are using the threat of the maintenance hikes to convince users to buy additional software but indicated they are able to negotiate terms based on software purchases. "If a guy has a list price and he wants a better deal, depending on where the company is in a fiscal year, you can always cut him a deal," Kumar said. Drawing a comparison to car sales, he added, "I'm sure our account managers are out there saying, 'OK, I will help lock you into maintenance if you are willing to buy more software.' "

Under the former site-license structure, customers paid CA one maintenance fee based on a percentage of the software license, regardless of how large or small the processor was. That structure treated all sites as IBM Group 30-class processors, which include low-end 3090 models such as the 100S and 120S as well as high-end 4381 models.

Under the tiered structure, separate, scaled prices are set for the different IBM classifications so that users with more powerful systems will pay more for the cost of maintenance. With the change, companies running CA software on large 3090 processors may end up paying twice as much for maintenance on some software when their contracts come up for renewal.

"We have to be able to do the same" as IBM, Kumar said. He claimed that with tiered pricing, IBM is able to sell software to customers using smaller processors at prices lower than the site-license fees for some CA products. "It's time for bigger customers to pay bigger prices and smaller customers to pay smaller prices," Kumar added.

According to Kumar, in both security and tape management software, CA has lowered the price of acquired software to match the price of its own lower cost product. For example, the cost of CA-1, a tape library manager known as UCC-1 under Uccel, was lowered to match the cost of CA-Dynam/TLMS. Kumar added that the CA-7 scheduler, known as UCC-7 under Uccel, is offered at the same price regardless of whether it is used on a Group 30 or 50 processor.

Insult to injury?

At MCA Corp. in Universal City, Calif., Geraldine Caruso, director of production information services, has seen annual maintenance prices for CA-Librarian and CA-Roscoe increase by approximately $6,000 each. She termed those hikes "outrageous" but was further upset that "CA wants to bundle new software that we are not ready for and that we are not sure we want into a deal that could bring down maintenance costs but would lock us in for five years."

Another "deeply irritated" customer is Joseph Huber, deputy administrator at Madison Technical College in Madison, Wis. "Not only are they going to stick it to us with a 40% unilateral increase, but these wheeler-dealers have tried to sell me more software," he said, referring to CA account reps.

In rebuttal, Kumar said, "CA does not hold maintenance as a hostage. We do not go out there and say 'If you don't license new software, your maintenance bill will go up.' In reality, most customers will not see an impact."

Kumar said that customers have not received written notification because most already have tiered pricing. "It is difficult to send out a blanket statement saying that all your stuff is being converted to tiered pricing because some software was already based on tiered pricing and some wasn't," Kumar said.

When customer assertions were described, Kumar said that he would have to examine each situation and would review any customer complaints. Noting that CA is closing out its last quarter of the fiscal year this month, he conceded, "Salespeople are doing anything and everything to make it a successful quarter, and maybe there are some that are going overboard."

Douglas Post, manager of technical services at Herman's World of Sporting Goods in Carteret, N.J., said he considers a 50% maintenance increase "a real eye-opener." But he said some of it was attributable to the expiration this year of price protection on many former ADR products.

Post said that in one way or another, he will have to pay the increase. "I might as well take advantage of effectively getting products for free rather than pay the maintenance," he said.

But Sam Dyke, supervisor of data processing and development at J. I. Case Co.'s manufacturing group in Burlington, Iowa, said that 5% increases appeared on his maintenance bill without warning or justification.

Dyke said that if he bought CA-Unicenter or prepackaged products, his sales rep said he could maintain today's maintenance prices. If he could choose the software, he said, he might have been interested, but the products contained software that he did not need or want.

Par for the course

Some Computer Associates users are not alarmed and others consider increases resulting from the move to tiered pricing of maintenance licenses par for the course.

Russell Bentz, manager of database administration at the State of Pennsylvania Higher Education Agency in Harrisburg, said that he has not had maintenance increases and that service and support has gotten better since the acquisition of Applied Data Research. That sentiment was echoed by Ronald Johnson, operations and technical support manager at Newell Co. in Freeport, Ill., who said he had not yet been affected by increases and that support had been satisfactory.

Brian Callahan, director of technical support at Central Maine Power Co. in Augusta, Maine, already had site licenses but said he viewed the maintenance increases negatively and as characteristic of CA. Callahan said that he tracks maintenance costs for companies that have been bought out. "For a company that does not get bought out, yearly maintenance increases between 4% and 7%," he said. "When a company is bought out — generally by CA — next year's maintenance jumps 20%. That's one hell of a load over the going inflation rate."

Jim Schultz, computer operations manager at Unigard Security Insurance Co. in Bellevue, Wash., said he anticipates increases when his contracts come up for renewal. In contact with many of his colleagues in other organizations, he said, "There has been a lot of leveraging — call it extortion." According to Schultz, the practice is not common in the industry, but he has seen it before.

Schultz said that other vendors do not necessarily send out written notification but that the industry relies heavily on traditional increases. "We certainly have not experienced increases this large," he said. "Is the tiered pricing an excuse?"

L. L. Bean & Co. in Freeport, Maine, reported satisfactory support since the ADR acquisition. Stafford Soule, data center manager, said he anticipates increases in the fall. "Theoretically, tiered pricing increases would affect our budget negatively," he said. "But as a consequence, you negotiate with the vendor."

ROBERT MORAN

3Com expands services, jogs users' memory

BY PATRICIA KEEFE
CW STAFF

SANTA CLARA, Calif. — 3+Open users grappling with "RAM cram" because of the 640K barrier will gain savings of as much as 130K bytes of random-access memory using several new memory-expanding services announced by 3Com Corp. last week.

This particularly affects users of MS-DOS-based applications — such as Borland International's Paradox — that require lots of memory, said Mark Freund, a network consultant at the Interconnect Group in Pasadena, Calif.

A separate component of 3Com's newly minted Demand Protocol Architecture (DPA) provides users on internetworks with rapid access to multiple protocol stacks without having to forfeit valuable RAM, 3Com claimed. It will also ease access to various hosts and servers — whether local or remote — that are based on different protocols without forcing users to resort to cumbersome gateways or rebooting every time they switch protocols.

"When you get into larger sized networks, you want to get things done as simply as possible. Users don't want to go through a gateway to get to the host. It slows things down, and multiple gateways are hard to manage," said James Pratt, a network consultant at Entre Computer Center in Oklahoma City.

DPA consists of two services: Netbios Protocol and the Resident Protocol Manager. A related announcement involves LAN Manager support for an existing service, Microsoft Corp.'s HIMEM.SYS driver, which provides users of Intel Corp. 80286 and 386 workstations with an extra 30K bytes of RAM.

Slated to be available as a free upgrade in 60 days, Netbios Protocol takes up approximately 20K bytes of RAM, freeing about 100K bytes by replacing the user's primary transport protocol for communicating with the file server.

Pratt has tested Netbios Protocol with large applications running under 3+Open on an IBM Personal System/2 Model 60 talking to a PS/2 Model 70 and has freed up to 520K bytes for applications processing.

Previously, Pratt could only accommodate large applications by cutting 3+Open down. He removed features such as Named Pipes from the client side and took such convenience terminate-and-stay-resident programs as electronic mail or printer notification out of the auto.exec file. "We'll still do this; users want all the memory they can get," he said.

The Resident Protocol Manager allows users to automatically load and unload protocol stacks as needed, said Alan Kessler, 3Com's 3+Open product manager. Users choose the capability from a menu that loads the required protocol stack from the file server, later unloading it.

"To have to reboot and change protocols [manually] is really ugly," Kessler said. This capability will reportedly ship midsummer as part of the next release of 3+Open.

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Next stepping out into business world

BY JULIE PITTA
CW STAFF

PALO ALTO, Calif. — Next, Inc. may be ready to graduate. However, the question remains — will it find a real job once it leaves school?

At a press conference to be held Thursday, Next is expected to announce that it will sell its workstations — previously sold exclusively to universities — through retailer Businessland, Inc.

Although both sides are keeping quiet about the deal, Next recently sent out invitations to the press conference. The firm said that "key software developers" will be in attendance and that the firm will make a "major business announcement."

A Businessland spokeswoman confirmed that company President Dave Norman and other executives will be attending the conference. "We will make comments after the press conference. . . . It's a the vendor's prerogative to make this announcement, not ours," she said.

The addition of Next in Businessland's line-up will fill the gap created by Compaq Computer Corp., which recently terminated Businessland as its authorized dealer. Businessland's strength is considered to be its success in selling workstations to large corporate users.

Despite the hoopla that the machine has engendered, corporate users promise to be a tough sell for the Next workstation. They appear unmoved by the machine's features, which include a graphical user interface that has been licensed by IBM and an erasable optical disk drive.

"I'm a very pragmatic person," said Ed Klein, director of the information center and data administration at Humana, Inc. in Louisville, Ky. "The issue isn't Next; it's what software will make me want to buy Next."

Bo Pitzker, systems analyst at Pacific Bell Directory's information services group in San Francisco, said Pac Bell would not buy the Next workstation because of a lack of applications software and the uncertainty regarding the Unix standard. "It's a very evolutionary architecture, but today it has little or no utility," Pitzker explained. "We won't buy it for the same reasons that people didn't buy the Mac in the beginning: There's very little software, and it's very much a closed system."

"We haven't brought one in yet," said Mary Howlett, manager of office automation systems at Hughes Aircraft Co.'s Ground Systems Group, a large customer of Apple Computer, Inc. "We haven't felt it was significant enough to jump on it."

Next founder Steve Jobs, the flamboyant co-founder of Apple, unveiled the Next workstation, a Unix-based Motorola, Inc. 68030-based system, last October. The big surprise during the flashy introduction was the price — $6,500 — and the only way to get the machine, as Jobs put it, was "to enroll."

Andor drops CPU plan, readies downsized DASD

BY J. A. SAVAGE
CW STAFF

CUPERTINO, Calif. — Andor Systems, Inc., Gene Amdahl's third attempt to grab some of the mainframe market from IBM, will not introduce a low-end mainframe as the company originally planned. It will instead be using its CPU technology to make a plug-compatible direct-access storage device similar to IBM's 3990-3 but greatly reduced in size.

"We found the best market for a CPU was inside the controller," said Bob Nuckolls, vice-president of systems development at Andor. The product will reduce the amount of room needed for the controller and two strings of 8-in. disks by a factor of eight, he said.

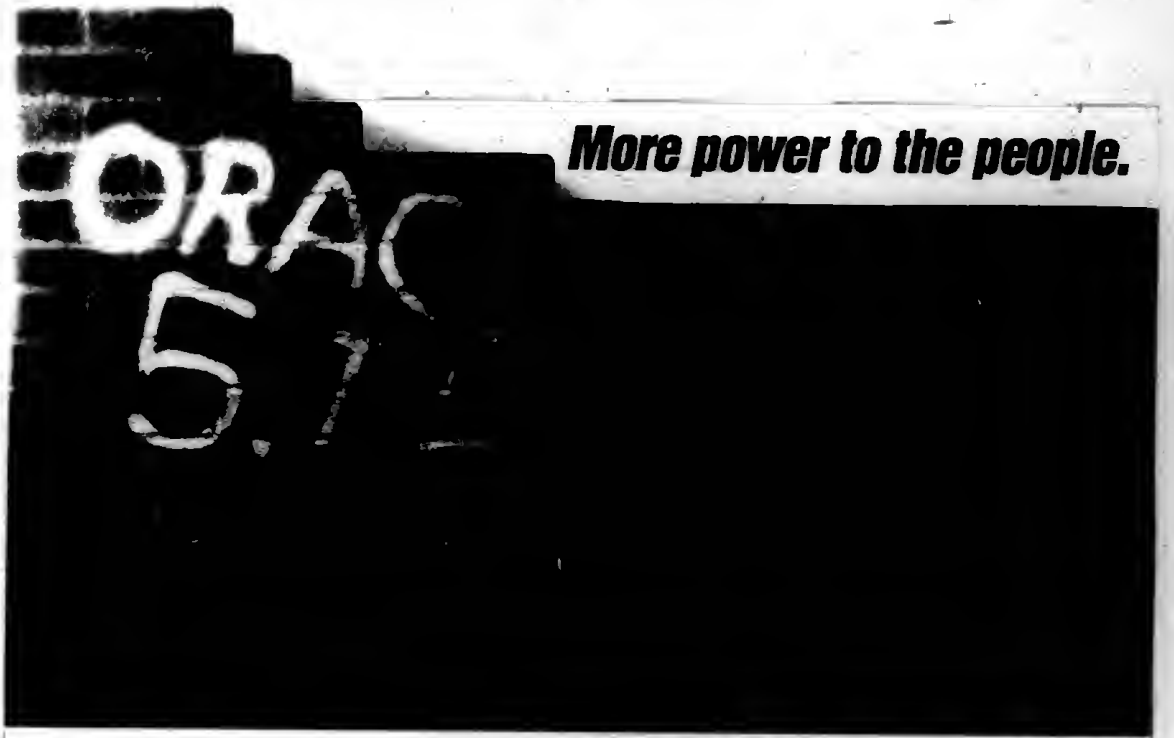
Nuckolls said he doubts the product will cost significantly less than IBM's. He said that the value added will be in the smaller size of the device. Andor expects to have a prototype ready by June.

Floor space needed for the product, so far called a "controller mainframe," should be between 12 and 16 square feet, according to Nuckolls. That includes room for 40G bytes and the controller, he said.

Since the product is set to have the CPU inside the controller, it may be able to function as its own system storage manager. If the software becomes available, the product could replicate IBM's System Managed Storage concept without the host mainframe running the most advanced IBM operating system, MVS/ESA, said Sayed Hussain, Andor's project manager.

Jim Porter, president of Mountain View, Calif., consultancy Disk/Trend, Inc., was skeptical, saying that there were few companies with the resources to sell and maintain such a product.

Andor is funded by other industries, including international companies normally associated with storage devices, and not with venture capital, Nuckolls said.



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TRBA

U.S. Justice review of Sabre merger stalls Delta linkup

BY ALAN J. RYAN
CW STAFF

WASHINGTON, D.C. — The proposal to merge the computer reservation systems (CRS) of Delta Air Lines and American Airlines has been delayed for at least two more weeks by what airline officials termed a routine ongoing investigation.

A U.S. Department of Justice spokesman would only say last week that the investigation into the proposed system was proceeding. Although the Justice Department would not confirm reports that it has sought information from rival airlines, a spokeswoman for United Airlines in Chicago said that the airline had been served with a civil investigation demand from the Justice Department. She said United will cooperate fully but declined further comment on the proposed merger.

Most competing airlines also declined to comment on the merger, but a spokesman at NWA, Inc.'s Northwest Airlines said the merger "would remove another healthy competitor from the CRS marketplace and would also have competitive implications for all airlines." He said Northwest is against such mergers and that the airline would go so far as to be in favor of divesting its CRS if all others who owned them would do the same.

The Northwest spokesman said CRS mergers could eventually lead to another wave of airline consolidation. "In 1983, 12 airlines controlled 83% of the passenger market in the U.S.; only five of those 12 airlines owned a CRS," he said. "In 1988, after the consolidation phase of airline deregulation, seven airlines controlled 87% of the market, and all of those seven were CRS owners."

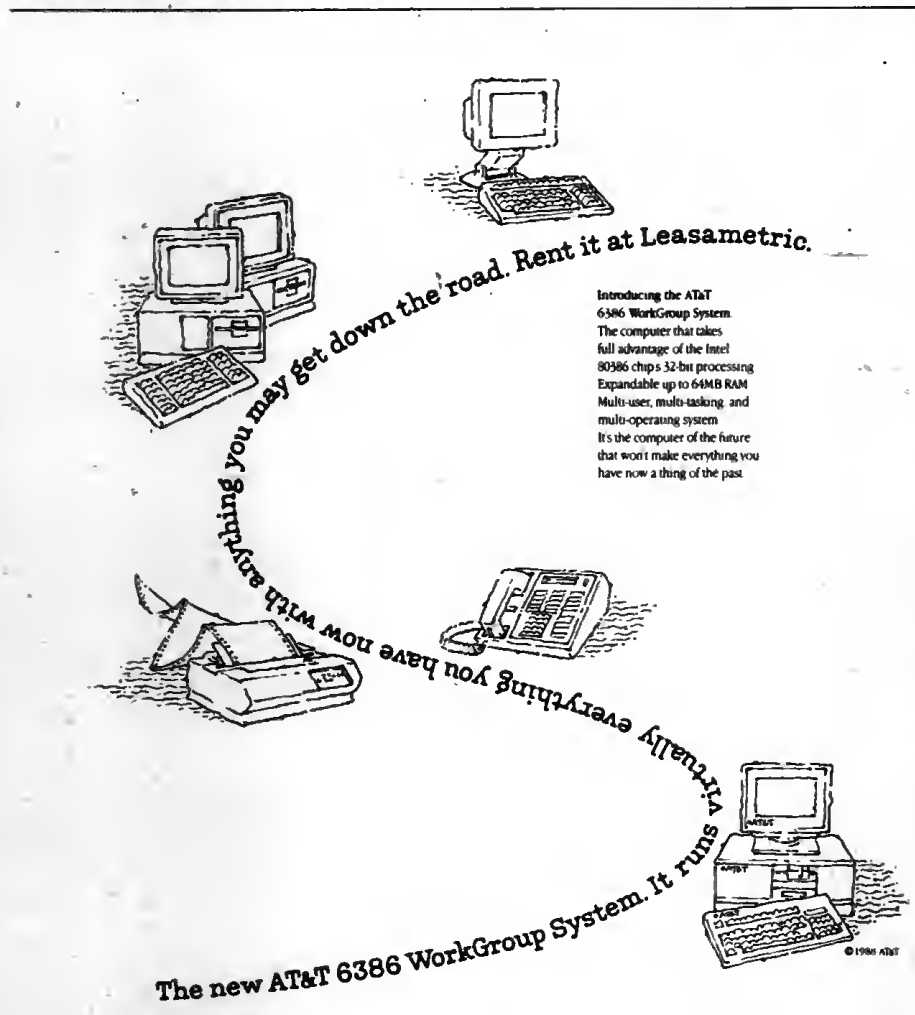
According to spokeswomen at Delta and American, the Justice Department has requested information on the system's setup, subscriber bases, data on contracts, market share and other general information. The original proposal was filed Feb. 7 with the Justice Department, and even with the request for information that arrived last week, the airlines expect a ruling by May 1, said American spokeswoman Karen Cook. "I know in this case [the Justice Department has] asked other airlines for information to make sure they have adequate information from both sides," Cook said.

The independent CRS company that would be formed from the merger would control about 43% of the domestic air travel reservation market. An American spokeswoman said that airline's Sabre CRS currently has a 37% market share. Delta controls another 6% of the CRS market with its Datas II system.

"It is not shocking that we'd be getting some opposition" from other CRS vendors and airlines, said Glenda Hatchett Johnson, a Delta spokeswoman.

American and Delta, which would each initially own 50% of the system, said they believe the Justice Department will approve the merger because the partnership is structured "so that any domestic carrier that is not already a participant in another CRS can automatically be admitted."

To gain entry, participants would buy into the system at $20 million per 1% share. "American can't vote them out. Delta can't vote them out," Hatchett Johnson said.



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HP severs last South Africa tie

BY J. A. SAVAGE
CW STAFF

PALO ALTO, Calif. — Hewlett-Packard Co. announced last week it was selling its South African sales subsidiary to Siltek Ltd., bowing to anti-apartheid selective procurement policies established by universities and local and state governments.

The move leaves NCR Corp. as the last major U.S. computer manufacturer with direct ties to the country.

"The [selective procurement] problem was measured in millions [of dollars]," an HP spokesman said. He said that HP field personnel encountered about 50 instances per day in which such policies impeded HP's chances of sales, adding that the company was seeing the same selective procurement momentum in Europe.

Critics of apartheid have targeted computer company ties to South Africa's government because, they say, imported technology facilitates repression of blacks through weapons and pass laws.

Withdrawal from South Africa had been an issue in six of the last eight HP shareholders meetings, although the proposals had been voted down. HP decided to go ahead anyway because of procurement policy pressure as well as pending U.S. legislation that would require the elimination of exports of U.S. goods and services to South Africa.

"These companies will come under pressure to end the last of their ties," said Richard Knight, a research associate at The Africa Fund, a New York-based anti-apartheid research and lobbyist group.

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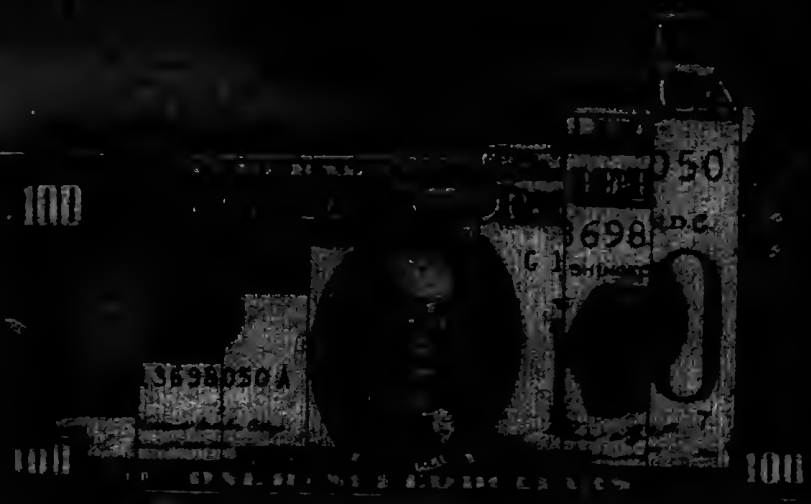

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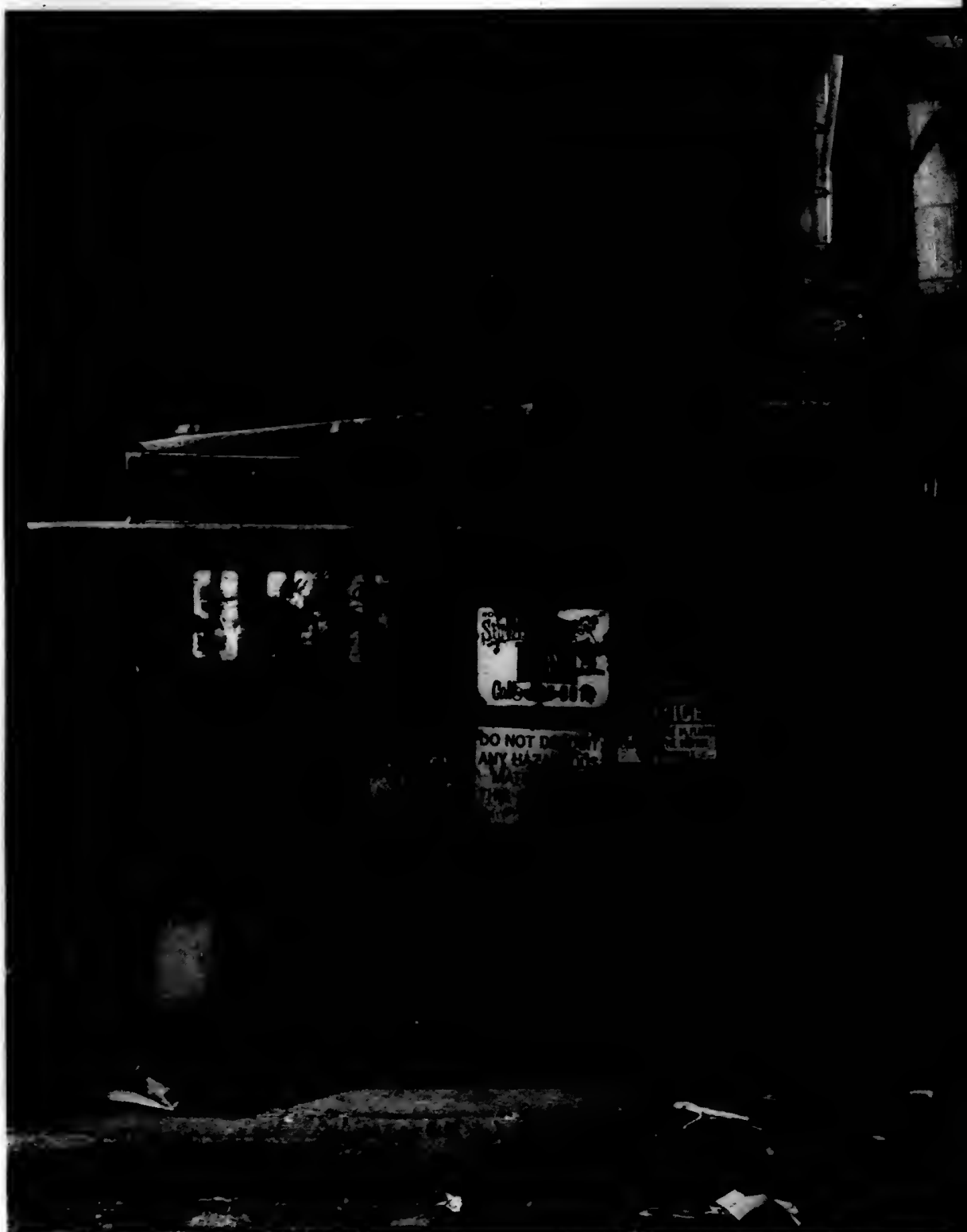

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Cincom to whittle costs, staff

BY STANLEY GIBSON
CW STAFF

CINCINNATI — Cincom Systems, Inc. is set to swallow a bitter diet pill by instituting dramatic cost-cutting measures to stem losses.

The moves, which take effect April 1, include mandatory unpaid leaves of four weeks for all staff within the next 90 days. As a result of the measures, Cincom may shed from 4% to 8% of its workers through attrition, according to Ron Hank, director of corporate relations.

The privately held Cincom did not announce the policies to the public or customers but informed employees in a corporate meeting and by a memorandum from President and Chief Executive Officer Tom Nies.

Down memo-ry lane

In the memo, a copy of which was obtained by *Computerworld*, Nies cited "inadequate performance of [Cincom's] direct sales organizations" as a major factor behind the slide. The memo described Cincom's fiscal 1989 results as showing a 5% revenue increase over the same five-month period a year earlier. However, expenses climbed 11%, throwing the firm into the red.

The memorandum further stated that the company will implement a plan of "selective reduction of nonperforming regions and/or departments and/or personnel and/or product lines and/or activities," none of which were specified.

When hearing of Cincom's setbacks, one user who requested anonymity said he decided to put a planned upgrade to Cincom's Supra Version 2 relational database management system on hold until the vendor's financial picture becomes more stable.

Another user, who also requested anonymity, said, "I've had concern for some time because of the discontinuity of people at Cincom." He complained that he has often had to explain his needs several times to new personnel assigned to his account.

Hank said the sales force restructuring is a move away from industry-specific sales to product-specific sales. In the process, Cincom will aim to field a sales staff that is more knowledgeable about Cincom's products. The firm's international sales organization "has remained product-specific, and their sales have increased," Hank said.

One of the users said this strategy makes sense. "Comprehensive database software does not require comprehensive knowledge of an industry," he said.

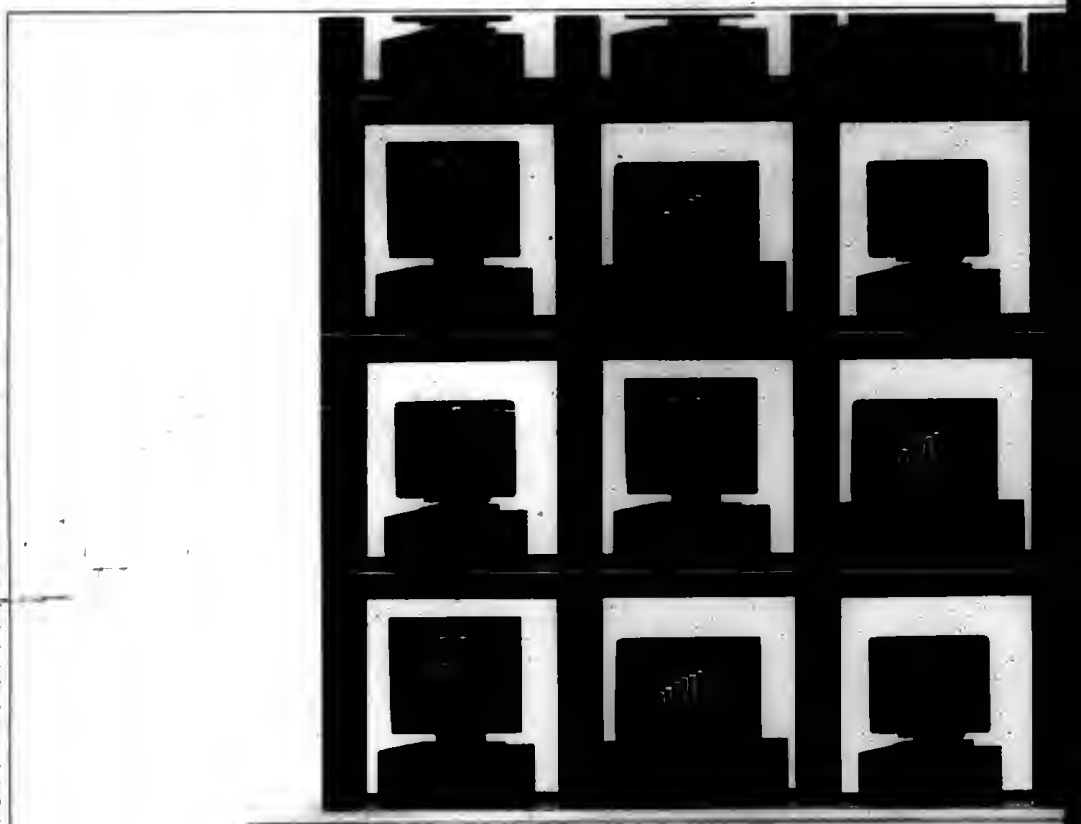
At the meeting, employees were reportedly told that Cincom's revenue is $22.7 million below the year's sales forecast, and if the trend continues, sales for the year will be $158 million, far below the company's stated goal of $194 million. Hank said, however, that the current worst-case revenue figure for the year is from $175 million to $180 million.

Analysts laid much of Cincom's troubles to IBM's DB2, which has blunted sales of Cincom's Supra in mainframe accounts, which are traditionally strong Cincom customers.

Ed Acly, a software analyst at International Data Corp., a market research firm in Framingham, Mass., said Cincom's problem is clearly Supra sales in the U.S., rather than in international markets.

Hank said employees may work without pay, or they may work through their unpaid period in the next 90 days and take the time off during the summer.

The Cincom memorandum said that by adhering to a wide-ranging laundry list of cost-cutting measures — 34 in all — the company will be able to save from $10 million to $11 million in the fiscal 1989 budget. The austerity program includes stringent spending allowances for sales personnel.



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IBM's Ford suggests optimum IS spending

BY MICHAEL SULLIVAN-TRAINOR
CW STAFF

IBM WATCH

How much should you invest in technologies that may or may not be applicable to your company's use of information systems?

IBM's Larry Ford has the answer. As manager of its $3.8 billion internal IS organization, Ford recommends firms use half of 1% of their MIS budgets as seed money to explore new technologies. This investment should be backed by a process that encourages innovation throughout the MIS organization, Ford says.

Both the central MIS function and individual sites should take a share of the seed money for their own use.

Which new technologies deserve exploration? Nearly all of them, judging by a recent presentation by Ford to MIS executives at the CIO Institute, a seminar conducted by Frost and Sullivan, Inc. in New York. At the seminar, Ford revealed IBM's view of the 1990s, which contained something for every technological interest. If you're interested in imaging, IBM is piloting it. Do knowledge-based systems strike your fancy? Check out the company's expert systems activity. Are you worried about the viability of computer-integrated manufacturing (CIM) or the flexibility of electronic data interchange? IBM's MIS is working in those areas, too.

Should all of these technologies play a role in your firm's future systems? MIS executives hearing Ford's presentation didn't think so. "Your interest in different technologies is a function of the particular industry your firm is in," says Robert Rubin, IS director at Pennwalt Corp. "But IBM . . . is working with all industries and wants to try everything."

While nonvendor MIS executives must select technologies appropriate to their users, Ford faces the dual challenge of meeting internal needs and mirroring the firm's view of its customers. Attempting to do both things at the same time is no easy task even with IBM's large systems budget, which is $1 billion more than General Motors' estimated $2.8 billion MIS budget.

IBM's interest in all technologies has resulted in many pilot programs. Internal MIS is trying to make sure the efforts are dropped if they are inappropriate or continued if they pay off.

Funding decisions for new applications are delegated to each of IBM's business units. With the exception of cross-unit or corporatewide systems such as CIM and corporate office and financial applications, approval is left to the line managers within each of roughly 120 locations.

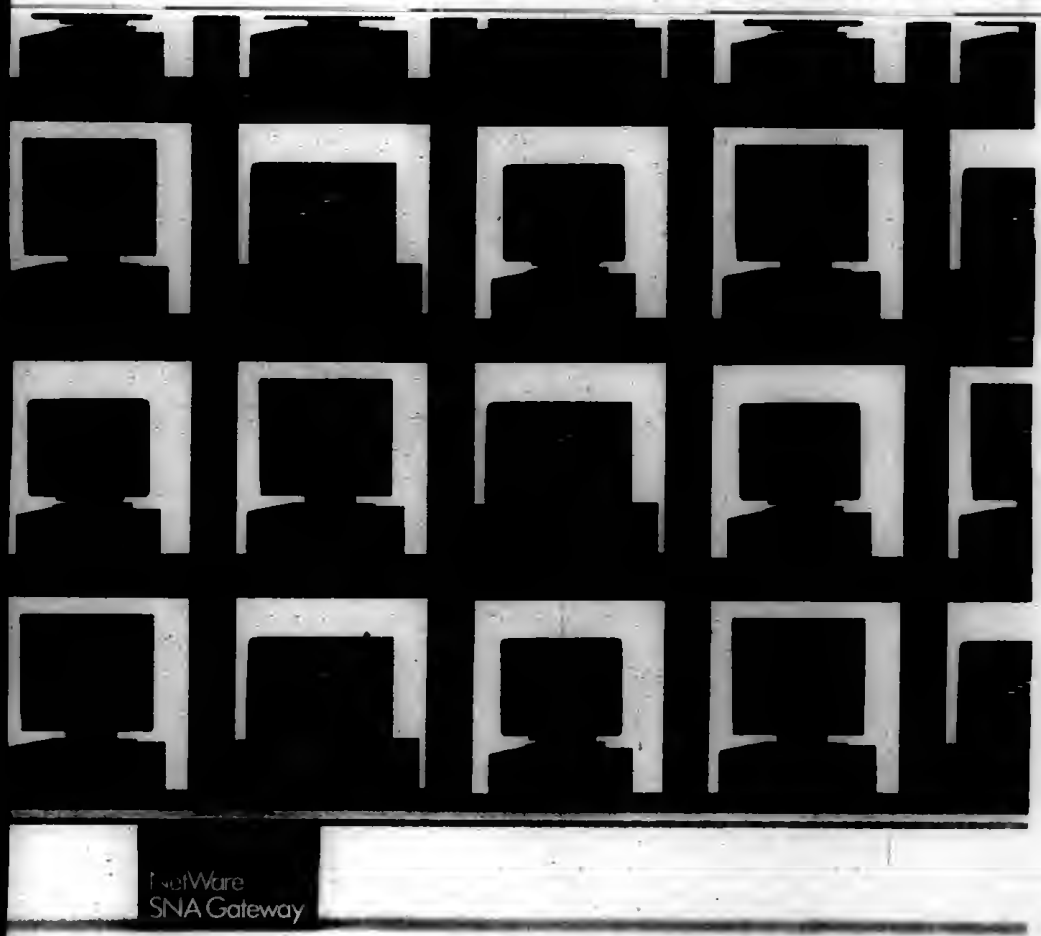
Unifying these efforts is Ford's central organization, which is aiming toward the following goals:

- MIS professionals need to develop systems integration and consulting skills.
- MIS must develop tools that can extract data from different applications and make that data available in a central repository.
- MIS must be organized in a way that allows new technologies to be applied to business needs.
- MIS must develop a network or provide access to a network for interconnected systems.

The most significant of these trends within IBM's MIS is the goal of transforming MIS professionals into systems integrators within the company. "At IBM, our MIS organization has tended to be a builder of new applications. More and more responsiveness to meet internal needs is a higher priority," Ford says.

IBM's MIS is also changing past practices and looking outside the company for software packages that meet internal needs. "We used to write all the solutions ourselves. Today, we will manage projects that include many different players to obtain the best solution," Ford says.

Sullivan-Trainor is a *Computerworld* senior editor, special projects.



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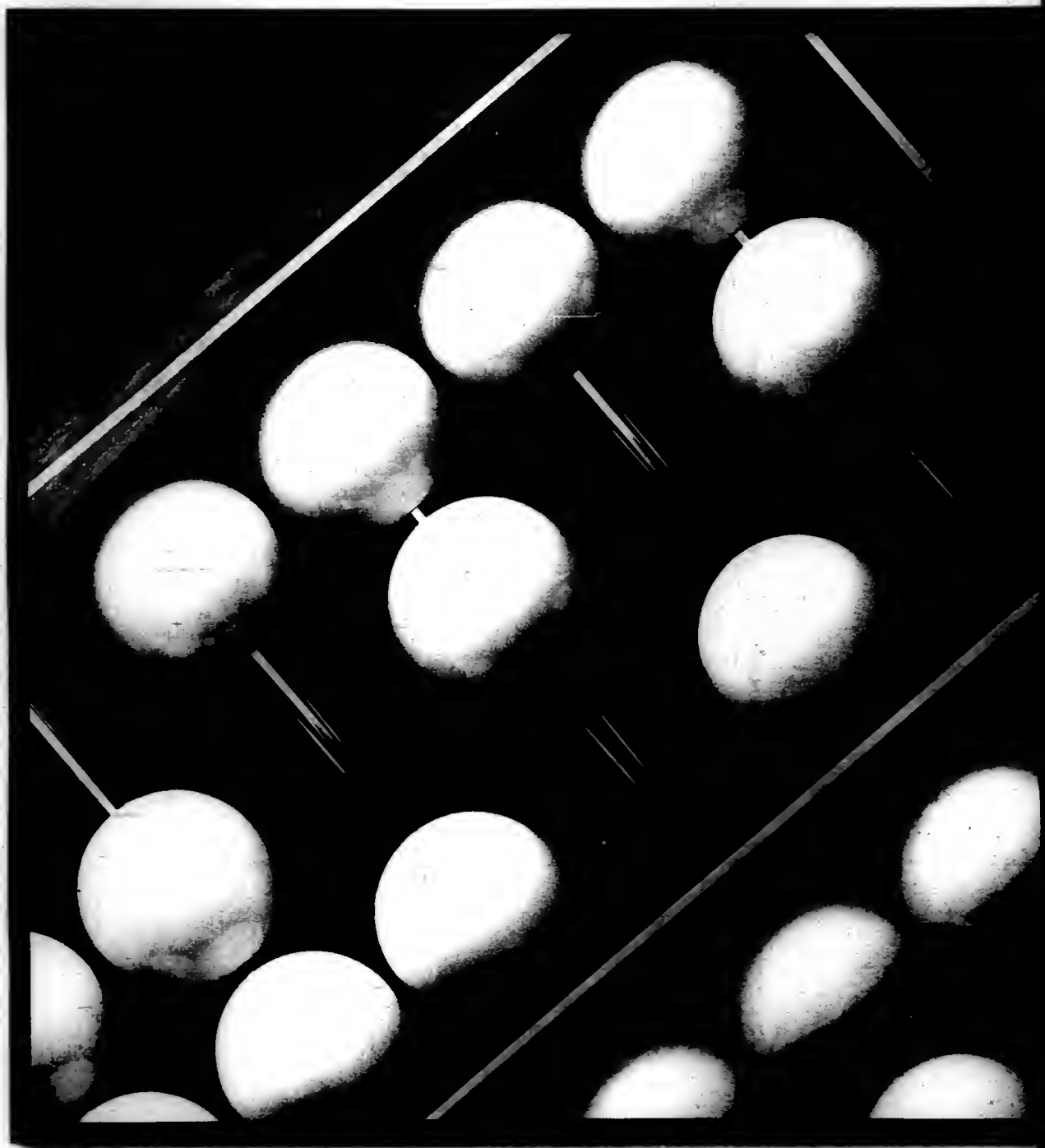

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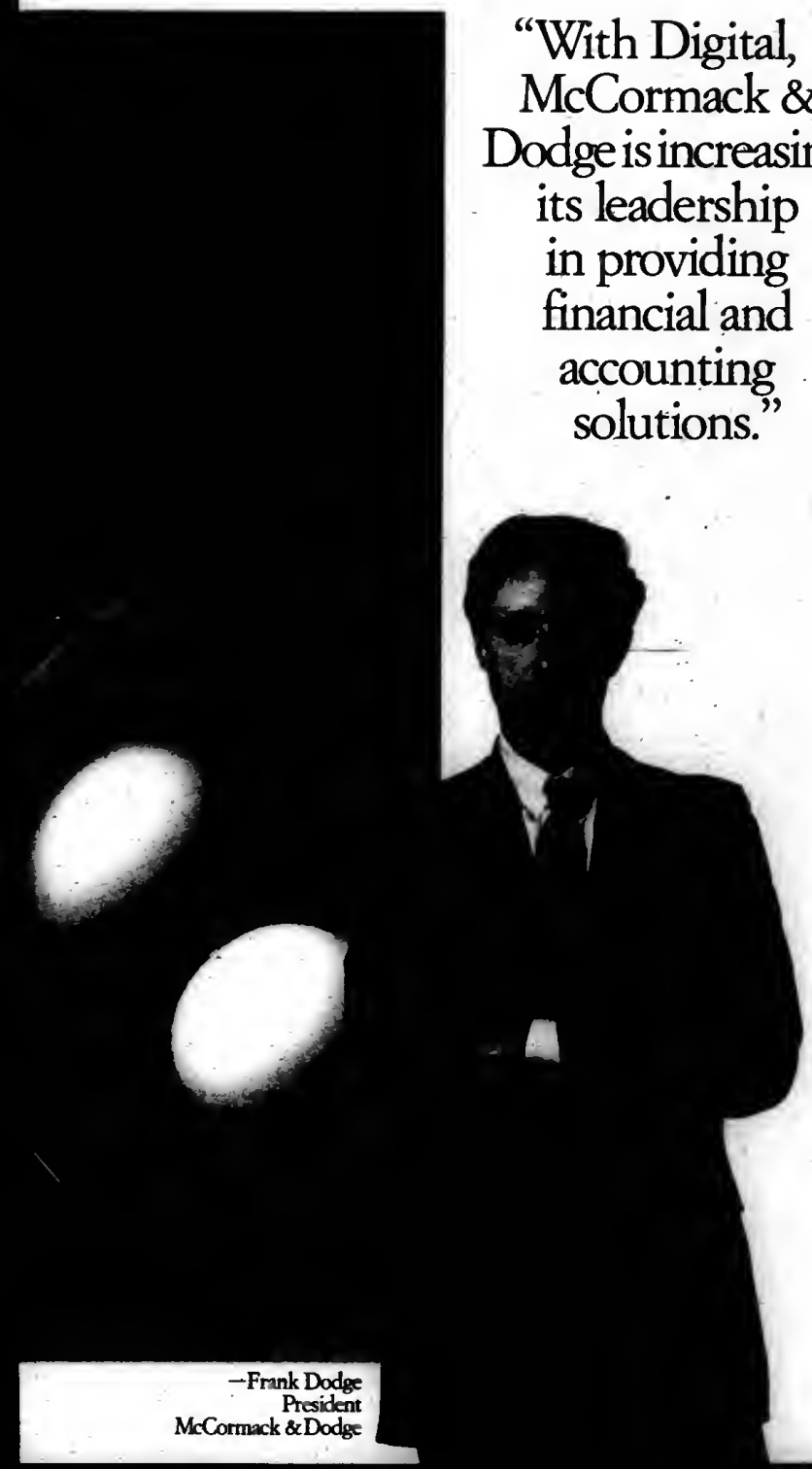

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EDITORIAL

Movin' out

TO IMPROVISE ON a line from a John Lennon song, "Imagine there's no data center; it's easy if you try."

Some companies are doing more than just imagining, and they are big ones. We focused on one such effort in *Computerworld* last week, the case of $11 billion consumer products giant Sara Lee Corp. There, the data center was closed a decade ago, and today the mass of computing power is scattered throughout some 50 business units.

However, the information systems tune within those units is still called in great measure by a corporate IS staff. This 24-person staff sets standards that the units adopt and acts very much like a typical central IS department in arranging volume purchases for these units.

Of course, what's good for Sara Lee is not necessarily good for Wells Fargo or Grumman. But there is an emerging trend toward shifting resources, human and otherwise, out of central IS and closer to the business operating divisions, and there are many good reasons why this trend will accelerate.

The most compelling reason is the fulfillment of the primary role of IS in the 1990s: the proliferation of information technology throughout the corporation. In the case of Sara Lee, closing the data center was the manifold expression of that role.

Recently, Forecasting Planning Associates, an IS consulting firm, studied IS staff distribution during the 20-year period from 1978 to 1998, selecting a large, "mature" insurance company as the subject. IS employment during that period rose from 160 to nearly 500. But by the end of the period, 70% of those employees were projected to be working outside of central IS in discrete departments, compared with only 3% in 1978.

For some of today's IS managers, this trend is sure to be unnerving. Many of them may mistakenly associate this movement out of the data center and into the user departments with the chaos that reigned a few years ago when the user departments "personal computerized" themselves with wanton disregard for central planning and enterprisewide systems design. And, in fact, some IS managers may be displaced.

But the real opportunity here is for IS managers and their adjutants to rise to a higher level of information management, just as information systems in general assume a more potent — and in some cases, primary — role in the corporation's competitive thrust.

Thus, the IS organization, with its reach extending everywhere in the company, mirrors the organizational structure of the company as a whole, as envisioned by management guru Peter Drucker. His vision of the company of the 1990s is like a symphony orchestra where "there is only one conductor, the CEO, and every one of the musicians plays directly to that person without an intermediary."

NEWS ITEM: WRONG MARKET NICHE BLAMED FOR POOR SALES OF IBM 9370.

LETTERS TO THE EDITOR

Pleasing leasing

For more than eight years, I have been successfully dealing with the CMI/CIS Computer Leasing Corporations [CW, Jan. 23]. Since then, because of CMI/CIS' existence and a few other reputable lessors, we have seen an increase in more cost-effective computer leasing methods. Deferred-payment plans, rollover contracts, value-added purchase agreements and many other innovative financial opportunities are just some of the methods that have been advantageous to a competitive computer leasing industry.

The industry needs competition — CMI/CIS has successfully helped to achieve this. It is certainly rewarding to see that CMI/CIS has not given up, that it is still actively marketing its products. CMI's protection under Chapter 11 has not affected its current leases.

Competition gives even the largest firms that require IBM's latest and greatest technology the opportunity of moving ahead because they know that this industry guarantees the release of their equipment through the third-party markets.

Martin R. Phipps
Assistant Vice-President
Provident Bank of Maryland
Baltimore

Levi's revises

Regarding your piece on Levi Strauss & Co. in your recent Special Report on Communications Innovators [CW, Jan. 30], there are a few inaccuracies in the piece that we would like to set straight.

The statement about Levi being drawn to electronic data interchange (EDI) because we failed to speed deliveries is erroneous. Levi-Link, our EDI program, is the end product of months of marketing studies done with retailers to define ways to improve the entire retailer business process.

Our EDI program is a response to their needs. As a customer service, EDI should result in quicker deliveries of the right product.

The pull-out quote about senior management being a major obstacle to retailer acceptance is misleading.

The statement should have conveyed the sense that a major obstacle is *retail* senior management's misunderstanding of the benefits of EDI, and not "senior management" in a generic sense.

Levi Strauss has not done unique vendor marking for Mervyn's or Wal-Mart. In fact, Levi's branded goods are not sold to Wal-Mart.

Finally, Levi-Link is based on AT&T EDI Retail hardware, not IBM Personal Computers.

Thank you for your interest in Levi Strauss & Co., and we hope your publication will continue to provide coverage of news about our exciting EDI programs.

Joyce Bustinduy
Corporate Communications
Levi Strauss & Co.
San Francisco

No super surprise

Robert Hargrove's Viewpoint article [CW, March 6] about the "superuser" has prompted me to respond with some thoughts from the other end of the co-ax.

I consider myself a superuser. MIS departments tend to look at the personal computer environment and its users as something less than mental giants. The superuser is not, however, a freak of nature. Hargrove seemed surprised that superusers "produce some remarkable and useful results." This statement makes it seem as though we are little more than monkeys sitting in front of a keyboard and once in a while we actually hit the keys in the right sequence to send a command.

The inherent limitations of personal computer software and hardware has made it necessary for us to seek other avenues to complete our tasks. With the introduction of emulation boards and supporting software, job/file transfers are now attempted and brought to successful completion.

MIS' "unwanted" functions are now a part of routine processing. "Mainframe people" inspire and impress to a lesser degree today. The difference between RAM/ROM is just in spelling for some vendors and MIS staff.

An attitude of one-way-street thinking seems to prevail through the concept of "growing your own" superuser. Why hustle your MIS staff (they are six months behind in application requests, right?) down the hall to accounting when, in the mind of your technical staff, they have drawn the short straw? Why not cultivate from the end-user environment?

Deborah K. McCaskill
Research Analyst
Topeka, Kan.

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.*

Artificial intelligence: The inside and out of LSI

CHARLES P. LECHT

Artificial intelligence, artificial expertise and artificial experience may now be purchased just about everywhere. These "faculties," as they're called, come packaged in a variety of ways — about as we would expect of commercial products like soap or cereal.

It is almost ironic that the powers artificial faculties bold are drawn from the most common of substances — sand — albeit sand that is transformed into silicon wafers and made into large-scale integration (LSI) chips of very small size.

We have every right to be astonished by this technology; it offers a kind of life-giving substance in a lifeless object that augments our natural faculties and extends them to perform unnatural feats of power.

LSI chips are now used to endow inexact human beings with precision, their fuzzy thinking with logic and their poor memories with recall. The bandwidths of our senses are now so improved by chip technologies that, by using them, we may now see through opaque walls and into the cosmos and microcosmos. We may now smell the faintest of odors, touch with the delicacy of an ant and hear with the precision of a bat.

With each improvement in LSI technologies, we push the frontiers of these faculties yet further into our real — but heretofore imperceivable — world.

As our natural senses and intellectual faculties are being extended, the world of our perception is getting closer. Can there be any doubt that these changes are largely being brought about by our computer world, at whose heart is LSI?

LSI's continual improvement is the result of the technology's weird capacity to feed on itself. With each incremental improvement in it, we extend our natural senses and intellectual faculties to deal with a larger, richer world of science. Each advance, in turn, increases our capabilities to create even more powerful LSI.

In one sense, each of us lives in two worlds: one outside and one inside. LSI is rapidly changing both. It is surrounding us and invading our lives faster than any other man-made item of which I can think.

In the outside world, LSI chips are now carried about in pockets and small cases. They are virtually everywhere — in corporations, banks, schools, libraries, government offices, even theological institutions.

They are found in such unlikely locations as beauty salons, sports centers and kitchens. They are found in wallets, on desks, in cars, in motorcycles, on trains and on airplanes. They are in all TV sets, compact disc players, radios and even in some toilet seats. Indeed, they are now in most electronic equipment save for the most trivial.

We cannot dial a modern telephone, turn on electricity, ride anywhere, study, work or enjoy the arts without turning on an LSI circuit somewhere. Talk about ubiquity. By the year 2000, we may find that doing anything and everything will involve an LSI circuit, save for singing to the wind.

In the inside world, the use of LSI is still in its infancy, but I reckon this stage will not last too much longer. The future holds much more for LSI than simply improving our five senses and intellectual capabilities. I believe that at the turn of the century, the use of LSI to improve our bodily organs will explode.

CHRISTOPHER BING

The explosion will occur when we accept that the natural organism that is us leaves a lot to be desired in its strength and intelligence.

LSI is currently being used to correct some biological deficiencies — for example, the kind that kidney and heart machines address. But these examples are really only the most primitive beginning of what will ultimately be accomplished.

For example, if cures for our most dreaded diseases are to be found, logic suggests to me that they will come from nonhatural, nonbiological sources. Cancer, the black hole of modern medicine, is a case in point.

In the future, LSI will be used in the preventive arena, too. Put it this way: If we knew it would be better than the natural way, few of us would hesitate to replace any organ in our own body by the kind of artificiality we may well expect from LSI. Silicon is not biodegradable.

Lecht is an IDG News Service correspondent based in Tokyo.

Strategic architectures up to users, not vendors

DALE KUTNICK

The data processing/communications industry is moving rapidly toward embracing standards for a wide variety of interfaces and architectures. This trend will accelerate in the 1990s, and users will no longer view specific products as strategic because only the interfaces and architectures will be enduring.

For example, IBM's DB2 may be strategic to the company's system software initiatives. But for users, it is the SQL interface and the upcoming IBM data repository that are most important as standards.

The proliferation of personal computers, local-area networks and midrange systems has raised users' awareness of the requirement for such standards — both industrywide and inside their own organizations.

Concomitantly, most vendors cannot afford to develop all the required interfaces for their proprietary systems, and third-party vendors — especially for software — are concentrating their efforts on DEC, IBM and open systems platforms.

Upholding standards

Even though many of these standards will not be mature, fully functional (like Unix) or even implementable (like Open Systems Interconnect [OSI]) until about 1993 or 1994, users are becoming increasingly concerned about investing in proprietary products that will not easily support upcoming standards.

As a result, the major computer vendors have begun marketing campaigns that detail how their systems will be integated with standards. Moreover, the vendors have developed architectures of their own to address the migration of their proprietary stystems to a more standard approach — for example, IBM's Systems Application Architecture (SAA) and DEC's Application Integration Architecture (AIA).

A key issue facing users is which open systems and interfaces must be considered in developing a future architecture and at what speed they will be implemented by vendors. Below are listed some of the principal architectures and interfaces for the commercial environment and when they will be implementable and functionally comparable to existing proprietary solutions:

- OSI — 1993-'95.
- CCITT X.400, FTAM (parts of OSI Layer 7) — now.
- X.500 (directory services) — 1990-'91.
- Integrated Services Digital Network — 1992-'94.
- Unix — 1992-'93.
- OSI/Network Management — 1994-'95.
- User interfaces: IBM and Microsoft's OS/2 Presentation Manager — 1989-'90; OSF/Motif — 1990; Unix International/Open Look — 1989-'90; Apple's Macintosh — now.
- SAA — 1991-'95.
- ANSI/SQL — now.
- LU 6.2 — 1989-'91.

Interfaces are the user view into the corporate information systems architectures, and standardizing on these is one of the first steps that must be taken to develop an IS strategic plan. Indeed, users must develop their own critical path to their future architectures because the IS vendors tend to be limited in their scope. For example, SAA will work well with a specified set of IBM equipment; DEC's AIA will integrate Unix and its VMS.

But what about users who have all three operating environments or those who have other proprietary operating systems that they wish to bring together? To combine the various operating environments they would like to support, users must pick elements and interfaces from the vendor offerings and integrate them into their own internal architectures.

Just getting started

While some leading-edge users are already designing their '90s corporate information architectures, most are still in the beginning stages. The first step is to assess the future business requirements — expanded services, new distribution channels, rapid growth and so on — and to determine, generically, the technological solutions that could address them. The latter requires development of a five-year technology scenario that includes vendor product and services strategies, available standards and various price/performance characteristics.

From this information, the user can begin designing an ideal future architecture — a set of systems and interfaces that can accommodate the business requirements. This step is the first in architecture management. A typical question to ask is, will the architecture be based on open systems such as OSI, on proprietary solutions such as IBM's Systems Network Architecture and/or DEC's Decnet, or some combination?

Next, the user must develop a "here-to-there" migration plan — such as which current systems should be frozen and which should be expanded or enhanced — from the perspective of the currently installed systems.

Evaluating the technical options and the direction is, in effect, technology management. As part of this exercise, users must develop a strategy for measuring the residual value of their major systems — a process I call asset management. This effort is critical for managing the cost of technology against data processing budgets.

While vendor architectures such as SAA can act as guidelines, they cannot fulfill all of users' integration requirements because their product-set focus is usually too narrow. Users must therefore develop their own strategic architectures and interfaces based on available solutions that best intersect with their future information systems directions.

Kutnick is president of Meta Group, Inc., a market assessment/consulting company in Westport, Conn.

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SOFT TALK

Stanley Gibson

User wins in X/Open Motif choice

If X/Open implements OSF/Motif despite the protests of Unix godfather AT&T, it will surely be a victory for openness and for the user.

Why? Questions of which interface is better aside, it shows that a single dominant vendor cannot control a group. At a recent X/Open board meeting, a majority of members voted that OSF/Motif be adopted as a graphical user interface. The willingness of several X/Open board members — who are also members of Unix International — to cast aside AT&T's Open Look for Motif shows they are not dominated by AT&T.

In addition, X/Open's embracing of Motif could push Motif that much closer to becoming an undisputed standard. With only one user interface — even if two fundamentally different versions of Unix exist — users can still reap economies in training and development.

Another X/Open vote will not be held until May, and the outcome could change. But adopting Motif would send a very powerful message that the drive to openness is an irresistible force that is larger than any single industry participant.

This argument is not tied to Motif per se. If Open Look

Continued on page 30

DEC benchmark undercuts IBM again

ANALYSIS

BY STANLEY GIBSON
CW STAFF

The long-awaited release of Digital Equipment Corp.'s audited Debit/Credit benchmarks for IBM systems left some observers scratching their heads because it confirmed earlier DEC results that recorded IBM systems performing at about one-third the speed IBM claimed.

However, the report could also shed light on the Debit/Credit benchmark itself, because DEC revealed several aspects of its methodology that offer clues as to how DEC and IBM could achieve widely disparate results while testing similar systems under the same benchmark.

Last July, DEC released unaudited Debit/Credit figures for IBM Enterprise System/9370, ES/4381 and ES/3090 systems, promising a detailed report last fall. IBM subsequently released an audited benchmark report on 9370 and 4381 systems that showed them performing about three times as fast as DEC had found. DEC's latest benchmarks were audited for the 9370 but not for the 4381 and 3090.

Kind of loose

"This points out the relative looseness of the Debit/Credit standard," said Tom Sawyer, senior consultant at the Codd and Date Consulting Group in San Jose, Calif. Sawyer, the auditor of the tests run by IBM, said that despite the wide divergence in results, it appeared at first glance that DEC conducted its tests in a responsible manner.

But such great differences, he said, ought to spur the Transaction Processing Performance Council (TPC) to lessen the leeway that vendors can take when performing the test. The TPC is meeting regularly to establish a Debit/Credit standard.

Omri Serlin, president of Itom International in Los Altos, Calif., and chairman of the TPC, said the council is working on a list of full disclosure items that is intended to expose any differences in testing procedure. Although the council recently met, Serlin would not offer details of the group's progress, saying that discussion will have to wait until a standard is ready to be announced.

Serlin would not predict when that announcement could take place, except to say that it should be early enough so that a significant number of tests can be done with the new standard in 1989.

In last week's report, audited by Peat Marwick Main & Co., DEC recorded a 9370 Model 90 under IBM's VSE, CICS and VSAM performing a maximum of 6 transaction/sec., while IBM tested the same system and software at 15.8 transaction/sec. DEC said the price per transac-

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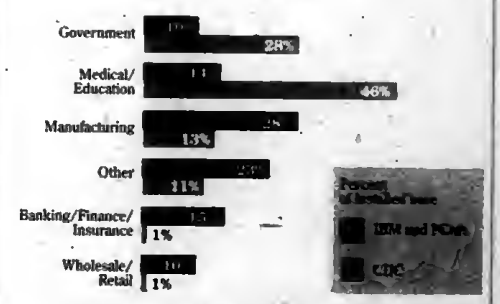
Inside

- Boston College banks on ATMs. Page 29.
- 3090 users seek service away from IBM. Page 29.
- Videocassettes move into storage realm. Page 30.

Data View

CDC's strengths

Compared with IBM and plug-compatible manufacturers, whose systems are more evenly dispersed through many industries, Control Data Corp. is more narrowly focused



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CW CHART: TOM MONAHAN

Picking and choosing

MVS-based Pick offering targets high end

BY AMY CORTESE
CW STAFF

The ease of use that many Pick operating system customers swear by will soon be available to large IBM mainframe users.

McDonnell Douglas Information Systems Co. recently announced it will team up with resellers to provide Pick Systems' Pick-based solutions for IBM MVS operating environments for the first time.

This ease of use has made Pick Systems' combination database management system and operating system a favorite of value-added resellers, resulting in a wealth of applications. With the introduction of Reality/370, McDonnell Douglas' version of Pick for IBM MVS environments, resellers can make these applications available to the largest mainframe users.

Reality/370 contains a compiler that translates Pick's code to IBM machine language. Value-added resellers will develop applications based on the DBMS and market turnkey applications to end users.

For the little guy

Norm Brygh, director of marketing at McDonnell Douglas, acknowledged that most of the 3,000 or so Pick applications were actually designed for small- to medium-size organizations. However, some applications — such as plant maintenance, retail and telemarketing — are appropriate for large enterprises that tend to have IBM equipment, he said.

While McDonnell Douglas said it plans to support all MVS versions, there are no plans for VM at present.

The company says it has lined up resellers that want to license Reality/370 and that turnkey applications will be available within the next several months.

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Product Spotlight: IBM PCs and Compatibles

Multi-generational Deployment of PCs. More and more, organizations are making use of PCs from different microprocessor generations. The lead article explores how they're doing it — and what roles are likely to be assigned to 80286 and 80386 machines once the 80486 emerges.

PC Supplier Requirements. As computers become more powerful and their uses more critical, the job of PC suppliers is changing. Here's a look at their requirements both today and tomorrow.

Laptop Competition. Two leading laptops go head to head as utility for sales support applications is evaluated.

IBM and IBM Compatible Comparison. A comprehensive chart shows how 80386-based IBM and compatible machines stack up.

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HARD TALK

James Daly

All DECed out

Ever seen a glacier move? Not likely, unless you're several million years old, sport eight-foot tusks and are covered with a rug of thick, matted hair.

But if you hop in your Chevy and take a trip to DEC in Maynard, Mass., you may see the next best thing. There, inside the restored and converted mills of DEC, the snailesque pace sometimes associated with large companies has been replaced with a schedule akin to Santa's workshop after the Thanksgiving dishes have been cleared: It's show time.

In the past three months, DEC has made no bones about the fact that it is a company in transition, and users have front-row seats. DEC has released a gaggle of new products since January, including one burst of more than a dozen hardware and software offerings that constituted the largest single-day introduction in its 31-year history. Machines ranging from personal computers to a workstation capable of processing 14 million instructions per second have been rolled out. Faster microprocessors have been promised. New Microvaxes and a high-end mainframe are also in sight.

Additionally, one DEC official claims the company expects to roll over its technological

Continued on page 34

Student info, to go

Boston College installs ATMs for student records

ON SITE

BY STANLEY GIBSON
CW STAFF

CHESTNUT HILL, Mass. — Although colleges and universities bring enlightenment, their administration and support systems often lag in the dark ages — almost everyone who has been to college can recall a horror story of bureaucratic intransigence or incompetence.

With this history in mind, Boston College, a Jesuit liberal arts institution located here, has begun Project Glasnost, which aims to bring administrative information to students through the use of automated teller machines (ATM).

The name implies openness and freedom of access to information — major goals of the system, says Bernie Gleason, BC's executive director of information technology. If the project is called Glasnost, then Gleason, who says he first thought of the idea six years ago, is the effort's Gorbachev.

"Quality of life is a factor. People don't want to wait in line," Gleason says, although he adds the system can be cost-justified in the amount of clerical time it saves.

First to use ATMs

Although giving students on-line access to information has been done by other educational institutions, Gleason says he believes BC is the first to involve an ATM in the process. Although just one ATM is currently installed, 10 are planned.

"The main thing is to use it to dispense information so someone doesn't have to go to five different places for different information," says programmer John Springfield.

Another benefit of ATMs is that they are secure and can be left to operate unattended 24 hours a day, seven days a week. They are also simple to use, with just a few option buttons.

GARY GILBERT

Gleason (left), Springfield (center) and Feck *enroll Boston College's informational ATM*

Gleason says he first experimented with computer terminals that students accessed by passing identity cards through a card swipe.

But the computer keyboard could be confusing, and the physically vulnerable CRTs had to be kept in secure areas. The college still operates three terminals in addition to the ATM.

Knowledge of how students interact with the terminals was applied to developing the ATM application, Gleason says. "Once we saw the acceptance, we developed the application," he says.

Cash not included

The ATM currently in use is a 1061 model made by Diebold, Inc. that retails for $5,000. The 1061 does not include a cash drawer, an expensive feature that is not needed in BC's application.

The ATM dispenses information about the courses for which

Continued on page 36

Users meandering from IBM 3090 service

BY ROSEMARY HAMILTON
CW STAFF

IBM may still be the preferred provider of service for its top-of-the-line 3090 mainframes, but a few users are looking elsewhere these days.

Two 3090 users contacted last week said they recently committed to Control Data Corp. because the company offered them a 3090 service package that was similar to the one IBM provides but more than 30% cheaper.

Observers said they expect the third-party 3090 service market to be only a moderate success, but the fact that it exists at all marks a turning point. Until recently, users had few alternatives to IBM when it came to 3090 service. Many IBM shops are still reluctant to hire anyone other than IBM when it comes to servicing a 3090, the most critical component of their data centers, said Donald Goodspeed, vice-president of service and maintenance strategies at Meta Group, Inc., a consulting firm in Westport, Conn.

However, a few users have determined that some recently introduced third-party offerings can provide the level of service IBM provides at a much lower cost.

Number-crunching

The Kaiser Foundation Health Plan of Ohio in Cleveland signed up with CDC late last year for 3090 service after comparing the CDC package with IBM's. Ron Balawender, director of information services, said he pays $2,850 per month for CDC's service; the similar IBM package would have cost $4,100.

CDC proved itself to Kaiser during the past two years by initially taking on peripheral devices and later servicing the company's 3083, according to Balawender. Last year, the firm sent out requests for proposal to both CDC and IBM for service on a recently installed 3090 Model 150E.

CDC has a service facility only two miles away from Kaiser's headquarters that provides remote diagnostics.

In addition, it has a team of customer engineers assigned to the Kaiser account. Even though CDC seemed to have the necessary pieces in place, Balawender

Continued on page 34

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Videocassettes pitched as storage option

BY ROBERT MORAN
CW STAFF

EAST HARTFORD, Conn. — Videocassettes, when not feeding the home television, are typically used for converting microfilm to optical disk, but the conversion media may soon establish an economical niche of its own in the storage hierarchy.

Scan-Optics, Inc. in East Hartford, Conn., is betting that its recently announced Image Easyfile, an image retrieval system that uses 8mm videocassettes, will be accepted as an economical alternative to microfilm in applications that require high-capacity storage but low retrieval rates. Typical applications pinpointed by the company include the processing of charge card slips and sales invoices, in which 3% of the stored information is retrieved.

European manufacturer Thorn EMI PLC uses videocassettes in a similar approach, said Scott McCready, director of optical storage at CAP International, Inc., a market researcher in Norwell, Mass. Both companies, he said, are trying to capitalize on commonly available, inexpensive media.

An Image Easyfile system with 28 cassette drives, a full-page image terminal, a facsimile modem, a printer that produces 1,500 page/hour and a magnetic tape drive costs about $250,000.

The system stores documents that have been captured and compressed by the company's Easyreader or Reliareader scanners, which range from $94,000 to $280,000. Scan-Optics quoted system prices for Image Easyfile that are twice those of comparable microfilm-based systems. However, Scan-Optics claimed significant savings on related labor and media costs.

In contrast, the company claimed that microfilm indexing permits an operator to locate only the general area of an image.

"Digital media offer very precise sequential access," said David Vellante, storage analyst at International Data Corp., a market research firm in Framingham, Mass. He said that digital technology is replacing the slow and imprecise sequential access of microfilm but that the technology has yet to offer the random access of optical technology.

According to Scan-Optics, 8mm video cassettes store approximately 40,000 images of pages, or up to 100,000 images that are approximately the size of a credit card slip.

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On The Road to Commercial UNIX

Gibson

CONTINUED FROM PAGE 25

were adopted over the protests of the Open Software Foundation (OSF), then users would be equally served. It would simply mean that a single standard — what the users want — is emerging.

2-4-6-8, time to extrapolate! DEC's recent benchmark audit report contained details of its extrapolations of performance by Tandem systems. DEC did not test the Tandem systems but only explained the extrapolations that were made last year.

Dave Zwicker, DEC on-line transaction processor consultant relations manager, said DEC might conduct actual tests on the IBM Application System/400 as well. But, he noted, such tests were not a high priority.

Last summer, DEC extrapolated AS/400 performance figures as well, basing its conclusions on Ramp C figures published by IBM and assuming proportional performance in Debit/Credit tests. Experts put little stock in extrapolations; DEC should limit itself to publishing results of actual tests.

DEC continues to perform tests on its own systems. But the company is limiting the tests to systems running VMS and not extending the tests to Ultrix-based systems such as the recently announced Decsystem 3100, which uses reduced instruction set computing microprocessors from Mips Computer Systems.

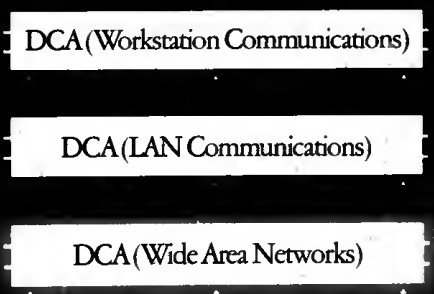
Bloodied but unbowed. Maybe it was Cincom's recent losses that put Chairman and Chief Executive Officer Tom Nies in a particularly feisty mood during a recent conversation. "In five years, less than 10% of all IBM database implementations will be DB2, and it will be 10 years old," Nies predicted. Neither will DEC succeed in its effort to push RDB to the forefront, he added.

On Unix — "Both IBM and DEC want to make Unix proprietary," Nies said. Nonetheless, he said, Unix is destined to play a major role in commercial markets, Cincom will support both OSF and Unix International versions, he said.

Ever the indomitable entrepreneur, Nies said that in two years, Supra will have more customers than DB2 because it will run on both DEC's VMS and Unix.

On IBM's Systems Application Architecture — "I believe SAA will never deliver on its promise," Nies said. SAA will be another series of disappointments: "How can SAA be a standard when such things as Netview, DB2, IMS and ESA will probably never be implemented on the AS/400?"

Gibson is *Computerworld's* senior editor, software.


DCA (Workstation Communications)
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Optical disk systems tailored for Feds

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The federal government's increasing appetite for optical disk systems is driving vendors to tailor their product lines to meet government requirements, according to some of those vendors.

"In 1988, we responded to two or three [federal] procurements. But in 1989, there have been 12 to 15 procurements announced for the first half of the year," said C. Allan Conover, president of Optimem, a Mountain View, Calif.-based maker of optical storage equipment.

Conover said that government demand for optical disk systems is increasing for at least three reasons:

- Agencies' small pilot programs are starting to mature and grow into larger systems.
- Systems integrators are linking optical systems to conventional data processing systems.
- Agencies are faced with paperwork overload at a time when government investigators want rapid access to records.

At the recent Federal Office Systems Expo '89 (FOSE), Optimem announced its 4000 series of write-once read-many optical disk drives. The high-end drives have an optics module that can read and write on optical disks made by any of the three major suppliers — 3M Co., Art Tech Gigadisc and Philips-DuPont Optical Co. — Conover said. This allows federal agencies to have multiple sources of media and allows the 4000s to read disks written by earlier generations of Optimem equipment, he said.

Users of Optimem's earlier systems can upgrade them by installing the new optics module to take advantage of the 4000's improved capacity and performance levels, the company claimed. The 4000 series, available in the third quarter of 1989, is priced at $17,950.

Conover said that Optimem's new strategy of providing forward and backward compatibility was driven by the government's fear of obsolete equipment and unreadable data. Users should not have to rewrite data from prior-generatioo equipment to keep up with improving optical disk drive technology, he said.

"It's a good attack at the marketplace, because they're calming people's fears that the technology is going to be outdated," said Jay Bretzmann, an analyst at International Data Corp., a market research firm in Framingham, Mass.

More announcements

Other vendors used FOSE to make announcements about optical disk systems and peripherals.

Wang Laboratories, Inc. unveiled a version of its Wang Integrated Image Systems product line that adds Tempest security features. Tempest is a government standard to prevent electromagnetic emissions leaking sensitive data.

The Tempest line combines Wang VS minicomputers, personal computers and workstations, optical storage devices and scanners that comply with the Tempest standard. The system price ranges from $150,000 to more than $1 million, depending on the size of the system. Deliveries will begin in August, Wang said.

Laserdata, Inc. in Lowell, Mass., announced a 5¼-in. optical disk jukebox aimed at departmental systems. The compact unit holds 26 platters. It costs $42,900, including jukebox management software, and is available immediately.

Terminal Data Corp. in Moorpark, Calif., announced a desktop document scanner that captures both sides of the page. The Docuscan DS-2600 costs $22,000 and will be available in April, the vendor said.

SOFT NOTES

Cincom adds four firms to program

Cincom Systems, Inc. said it added four companies to its Computer-Integrated Manufacturing Alliance Program: **Transettlements, Inc., Birmingham Computer Group, Inc., BSA Systems** and **Cyborg Systems, Inc.**

Transettlements and Birmingham offer electronic data interchange packages, BSA offers sales forecasting software, and Cyborg offers payroll software. Cincom said its products will complement Control:Manufacturing, its manufacturing management information system.

Prime Computer, Inc. established a software-licensing policy under which users may borrow **Calma Co.** software that resides on a local-area network managed by Calma's Library License Server software.

Calma, a business unit of Prime, offers mechanical/architectural, engineering and construction design and manufacturing software that runs on Apollo Computer, Inc. and Digital Equipment Corp. workstations. The list price of the library software is $15,000. Access to the library may be purchased for a one-time $2,000 per-node fee.

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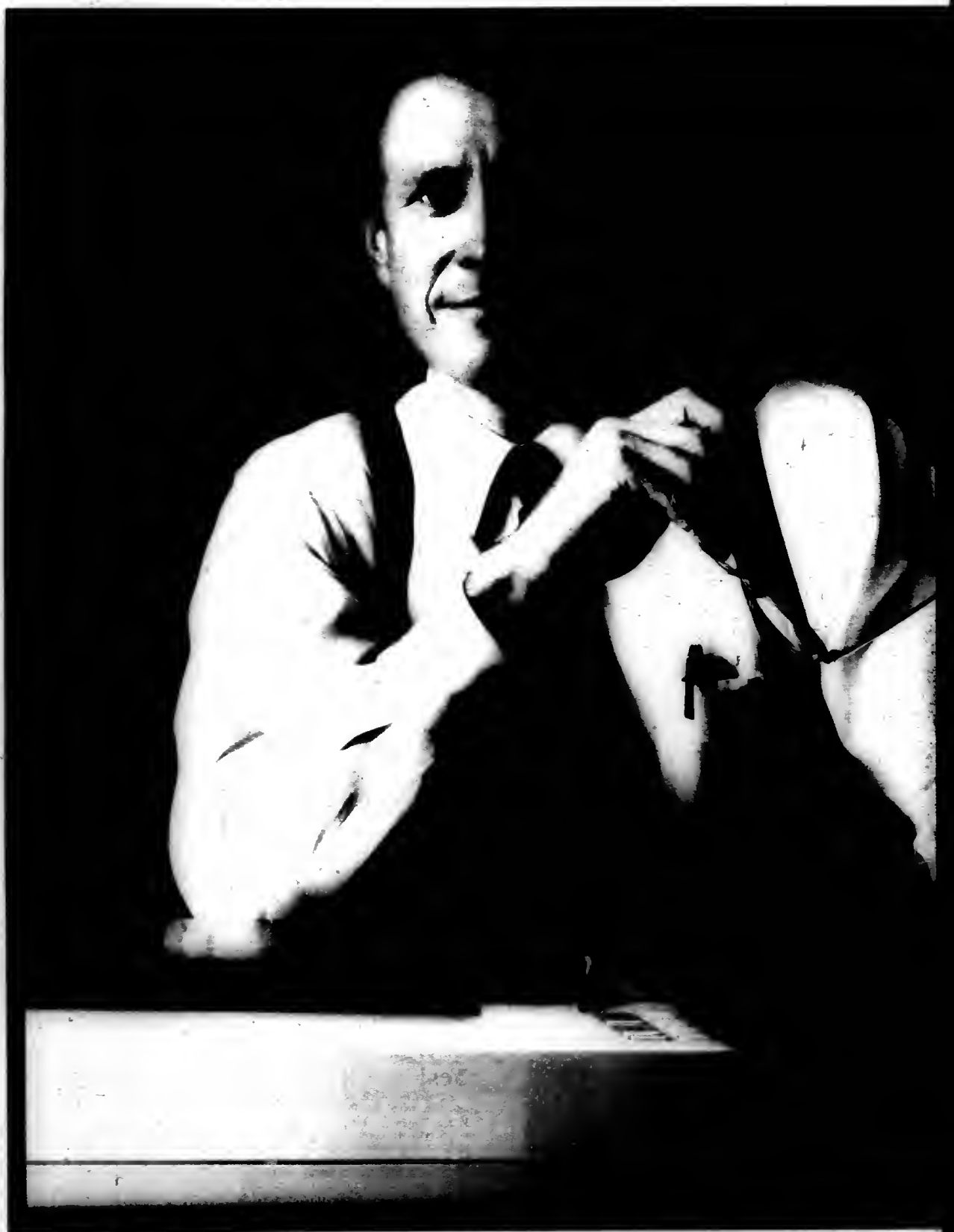

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EPSON

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Daly

FROM PAGE 29

achievements as often as every nine months. From now on. Forever.

This changeover is not only exciting for DEC but beneficial for its customers, who have been promised easy upgrades. But the move doesn't spring from any great altruism as much as it does from the most salient law of survival: eat or be eaten. In the past few years, DEC has seen its traditional habitat — the midrange market — crumble faster than a 25-cent balsa-wood glider. Sun Microsystems and Apollo have buffed up their high-end workstations, slashed their prices and left DEC and companies like it holding the bag.

The insight may have been a few years in coming, but DEC now realizes there is no way to sit fat and happy in the midrange market and expect to stay there for very long. Only a few weeks ago at a product marketing confab, founder of the feast Ken Olsen warned employees to hold on for a ride. The major corporate goal, according to the Decvine, is annual financial growth of 20%, price-cutting of 30% and no employment growth during the next three years.

Call of the wild

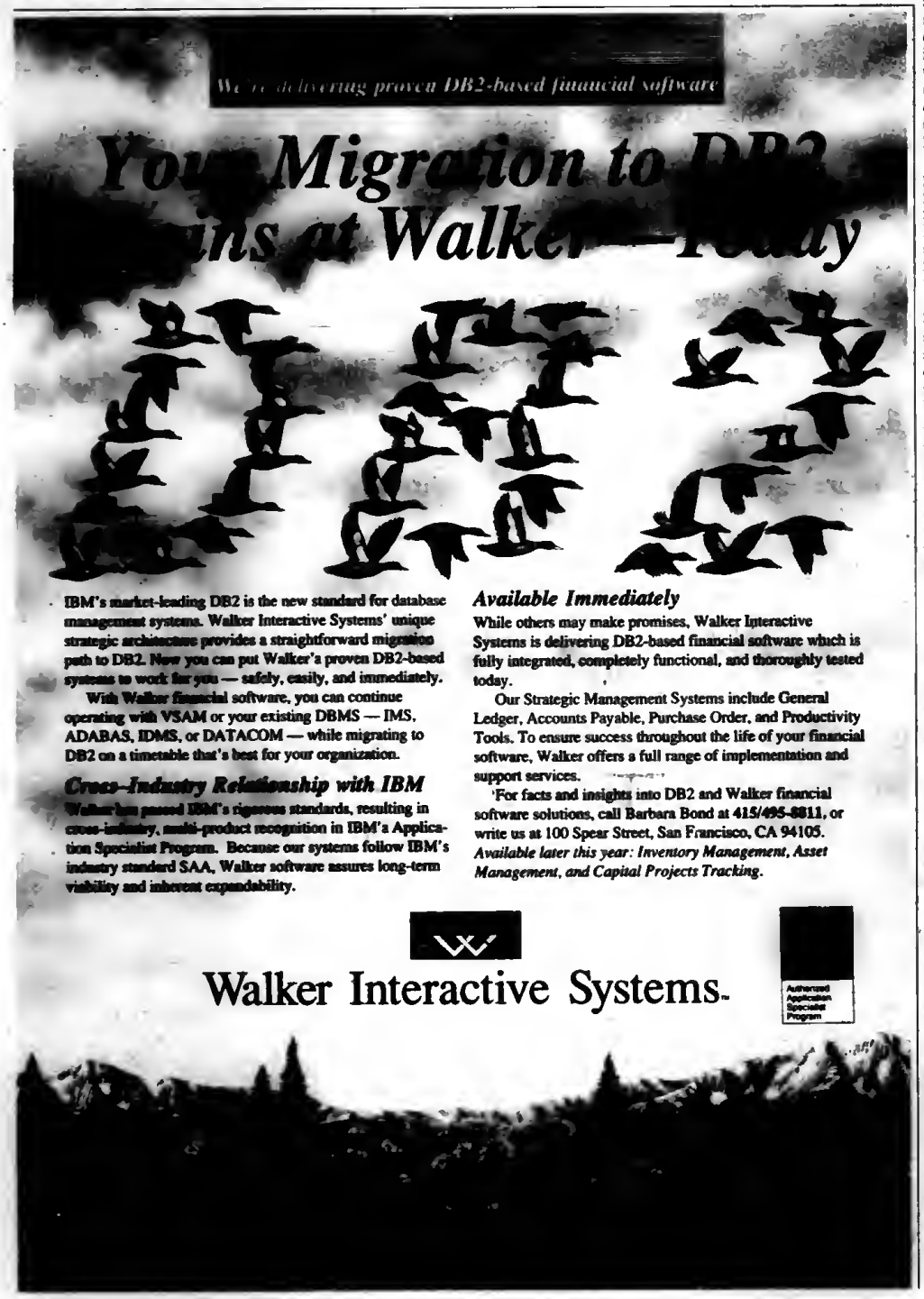
Olsen has apparently decided that the most effective amplification for his trumpet call to "innovation, leadership and aggressiveness" is through example. The introduction of the seemingly out-of-nowhere reduced instruction set computing-based Decsystem 3100 is a prime case. Company insiders say Olsen decided the Thursday before Uniforum 1989 opened its doors that he wanted the Decsystem to come out with a flourish the following week. Several cases of caffeine pills later, weary DEC staffers pulled back the curtain on the new machine.

The up-and-at-'em thrust is also felt within the company's structure. With the forecast of dismal quarterly financials looming, several observers claim there is a major reorganization under way at DEC, with more emphasis on pumping out products and less on vertical marketing.

"They're pushing as many products at customers as they possibly can to get their revenue back in shape," says Bob Randolph, director of program services at Technology Financial Services in Westford, Mass. "They're getting nervous."

Nervous or not, users should be happier than a kid in a candy store. There's nothing like some economic warfare among competitors to bring out the most product bang for the buck. While the organized chaos of stepped-up technological cycles and the blitzkrieg of introductions may bode poorly for the sleep patterns of DEC employees, it is the best news users have heard in years. Let's just bope the Ice Age doesn't return.

Daly is a *Computerworld* staff writer.



3090

FROM PAGE 29

wanted to go a step further. He said several guarantees were written into the contract to ensure that CDC would come through for them.

Last month, one of the thermal conduction modules in the 3090 was down. CDC fixed it within three hours, Balawender said. The contract stipulates that such problems be fixed within four hours, he said.

No complaints

"They've adhered to every aspect of the contract," Balawender noted. "All I can tell you is that our service has been excellent."

Robin Kasemeyer, director of computer operations at Arbitron Co. said she also selected CDC for 3090 service because its offering was the same as IBM's but cost 30% less.

"I wasn't displeased with the IBM service," Kasemeyer said of the one-year IBM warranty period that came with the company's 3090 120E.

"I changed because of the cost factor. Some people may say cost isn't an issue, but it is when the two offer basically the same service."

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Student info

CONTINUED FROM PAGE 29

a student is registered, instructors, class rank, grade point average, the previous semester's grades, status of financial aid and the status of a student's account. To keep student access at a moderate level during the early stages of implementation, the ATM was not put in a central location. Still, it is used for access about 200 times per day, Springfield says.

Rod Feak, director of Boston College's computer center, says he spent about three weeks poring through Diebold manuals in an attempt to figure out how to connect the ATM to an IBM mainframe. Having figured out the basic programming requirements, Feak gave the assignment of writing the program to Springfield, who says he took about a month to write the PL1 program for the CICS application. The program runs on an IBM Enterprise System/3090 Model 120E running MVS/XA under VM.

Gleason says he tried to interest bank ATM machine vendors in his idea six years ago but got nowhere. "They were too focused on the bank market," he said. But to Gleason, the similarities between the bank market and a college campus are inescapable: "If I could look at another industry that resembles a university, it would be banking. We don't have a tangible product, but we offer services and we have a lot of transactions."

Gleason notes that the BC campus is also a residential one in which students are present around the clock — just like any community in which ATMs are intended to serve the banking public.

In anticipation of using ATMs or other remote computing devices, Gleason ordered student ID cards made with a magnetic stripe that conformed to American Bankers Association standards. Such a card is open to many uses, from gaining admission to sporting facilities to checking books out of a library. A current use is purchasing food at sporting events. The cost of a hot dog and soda can be debited from a student's account by swiping a card through a reader.

Although Gleason had to convince Diebold that he had a need for a machine intended for banks, Diebold now says the university market is loaded with possibilities.

Streb points out that BC is a natural for the ATMs because their information is designed to be shared among departments.

"BC's system is integrated. For example, the data in registration is shared with billing. A number of universities don't have integrated information," Streb says. Without that integration, a college could not supply the ATMs with the informations students would want.

Gleason says the work done by banks in designing security is a great asset. "As long as they follow banking guidelines, security will not be a problem," he says. For example, the machine "eats" invalid student cards.

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DEC benchmark

CONTINUED FROM PAGE 25

tion/sec. for the 9370 was $116,000 while IBM had claimed $31,100 per transaction/sec.

A major difference in pricing the systems was the cost of a 3720 communications controller, which DEC included but IBM excluded. The price difference, $150,825, markedly affects the price per transaction. Whether or not to include the cost of a controller in the tested configuration has been debated by the TPC.

In configuring the 9370 Model 90, DEC also calculated higher software charges based on buying IBM software in a package rather than piecemeal. The cost of the controller, software and other hardware add up to a difference of more than $200,000 between the IBM and DEC configuration prices.

A major performance difference could come from the way the two vendors handled journaling. While DEC used only disks for journaling, IBM performed journaling on a combination of disk and tape.

"The I/O offloaded from disk to tape would give much higher throughput," said Dave Zwicker, a DEC spokesman. Sawyer confirmed that such a difference could result in a wide divergence in performance.

Sawyer said that journaling on disk might be desirable for some users, but IBM users seeking high performance will do journaling on tape rather than disk. "People will journal wherever it's most effective," he said.

"There is an artificial bottleneck in the system the way they configured it, and where it is, I don't know," said Kenneth MacMorran, manager of IBM's midrange performance evaluation center in Dallas and an IBM delegate to TPC. A change from disk to tape "would probably affect performance but not that much. I can't even come close to explaining a 300% difference."

MacMorran also said an integrated controller should have been used with the 9370, a measure that would have significantly cut costs. "I don't know why they included [the 3720]," he said.

Another difference that could affect performance is that indexed file access was used by DEC with the IBM systems it tested. Using indexed file access on the IBM system would make it perform slower, Sawyer said.

DEC also implemented basic mapping services, another difference that would add overhead to the IBM system, Zwicker noted.

"If these guys can't make it happen, then the data processing industry is in sad shape."

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Development tools

Language Processors, Inc. has expanded its line of Unix-based productivity software tools with the announcement of Coedit.

The package is reportedly an integrated editor that can be used with proprietary compilers or stand alone with other Unix software products. Designed specifically for software developers, Coedit offers a built-in compilation command, an expression evaluator and a pre-syntax checker, the vendor said. It is priced at $349, and deliveries are scheduled for the second quarter.

Language Processors
959 Concord St.
Framingham, Mass. 01701
508-626-0006

Software Components of Colorado, Inc. has released Version 2.0 of the Window Management System (WMS). The software program runs on Digital Equipment Corp. VAX computers under the VMS operating system.

WMS was designed to allow programmers to build sophisticated window-based applications in a VAX environment, the vendor said. The program reportedly includes over 50 runtime modules, and new features include C language source-code generation capabilities. A site license costs $2,000 for multiple VAXs of any size.

Software Components of Colorado
6575 Denim Drive
Colorado Springs, Colo. 80918
719-531-6940

NEW PRODUCTS — SYSTEMS

Processors

Two minicomputers designed to provide Tempest security for processing sensitive information in government and commercial settings are now available from Wang Laboratories, Inc.

Designated the VS 7150-T and the VS 7310-T, the systems support large-scale data processing, integrated image processing and office automation applications, the company said. The VS 7150-T supports as many as 128 users and is priced from $203,000. The VS 7310-T supports as many as 192 users and is priced from $267,000.

The systems can be configured either as stand-alone processors or as nodes in distrubuted networks with up to 32M bytes of memory, according to the vendor.

Wang Laboratories
1 Industrial Ave.
Lowell, Mass. 01851
508-459-5000

Power supplies

A line of power supplies designed for test systems and laboratory use has ben introduced by Lambda Electronics, a division of Veeco Instruments, Inc.

The LLS Series incorporates a self-oscillating, magnetically regulated inverter and a digitally controlled front panel, according to the vendor. The proprietary circuitry reportedly permits 200 KHz operation and a wide output range that allows for a 50% size reduction. The series is priced from $550.

Lambda Electronics
515 Broad Hollow Road
Melville, N.Y. 11747
516-694-4200

Digital Equipment Corp. has announced its HA3000 three-phase Uninterruptible Power System (UPS).

According to the vendor, the system protects against power outages, voltage surges, spikes, high-energy transients and electrical noise. The standard configuration consists of a UPS cabinet and matching battery cabinet, and options include a remote status panel and an input isolation transformer.

The HA3000 series is priced from $37,000 to $75,000 for units from 20 kVA to 80 kVA.

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Action Software International is a division of Mazda Computer Corporation with offices in Canada, the United States and West Germany. For more information, call:
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March 15, 1989.

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MICRO BITS

Michael Alexander

Keep 'em honest

Not long ago, I reported on a Florida television newsman who allegedly accessed a computer system at a rival TV station to retrieve the station's plans to cover upcoming events, rundowns of evening newscasts and other important information (to a TV station, anyway). Two weeks ago, the newsman and his boss, who was not involved in the reputed crime, were fired.

The case is interesting because it points out that most computer crime — whether it is the unauthorized access to a company's files or the planting of a time bomb designed to destroy programs and data — is likely to be carried out by current or former employees.

So how do you make the most of end-user computing while at the same time making some reasonable attempt to protect your company's data? If the guidelines are overly stringent, end users cannot do their work effectively. On the other hand, if they are too loose, you run the risk of a disgruntled employee bollixing up your data.

There are several ways for a company to protect its computer

Continued on page 47

Is RISC horsepower desirable?

Low prices on PCs and lack of workstation software hold buyers at bay

BY JULIE PITTA
CW STAFF

Workstations based on reduced instruction set computing (RISC) are being billed by their designers as the Ferraris of the desktop — they're sleek and they're fast. However, the recent flurry of RISC workstation introductions has users asking, why buy a Ferrari when a Toyota will do?

"The power users will gravitate toward anything that will allow them to do their jobs more quickly. They'll pay the price," said Ed Sund, a personal computer support specialist at Weyerhaeuser Information Systems, the information management arm of the Tacoma, Wash., forest products company. "We have some of those people here. But they're not the average user."

Competitive prices

Unlike those who crave Ferraris, which carry a price tag prohibitive to the average consumer, computer users interested in speed are not expected to suffer for long. David Burdick, a vice-president at Dataquest, Inc., a San Jose, Calif., market research firm, said he expects RISC-based workstations to drop to less than $10,000 by early 1990 and compete in price with Intel Corp. 80386-based PCs.

In fact, Burdick predicted, 386-based PCs that are specially configured with enough memory and storage for computer-aided design (CAD) will probably be more expensive than comparable RISC machines.

Even today, the price/performance ratio of workstations is impressive. Digital Equipment Corp.'s Decstation 3100 delivers 14 million instructions per second at a base price of $11,900.

But managers contend that few users in their companies require the kind of speed that RISC technology provides. The vast majority are using their PCs for word processing, spreadsheets and some database management applications, none of which require peak processing speeds, they noted. "I don't have any applications that need that kind of power," said Anthony Oresteen, a vice-president at Continental Bank in Chicago. "We don't have a lot of people doing CAD — that's what you would need a machine like this for."

Cost incentive

Oresteen said the bulk of the bank's work is being performed by 386-based systems running at 16 MHz. The average price of such a system is about $5,000. Prices for what is currently the best-selling class of PC — sys-

Continued on page 45

Macs blast off for U.S. aerospace companies

BY JULIE PITTA
CW STAFF

Imagine the Macintosh computer soaring to the stars.

In a sense, it is. Sales from West Coast aerospace companies have helped launch Apple Computer, Inc. into the corporate universe. With its Mac in vogue at giants such as Hughes Aircraft Co., McDonnell Douglas Corp. and Lockheed Missiles & Space, Apple has raked in millions of dollars in corporate sales.

How is the Mac being used in aerospace? Largely as a general-purpose computer, although it is making some inroads against workstation vendors in the computer-aided design (CAD) field.

"With aerospace, the Mac is being used in much the same way it is in other companies," said Jim McKenzie, a support specialist at Boeing Computer Services Co. in Seattle. "Somebody somewhere here is doing anything that can be done with a Mac every day."

Although Boeing declined to specify how many Macs have been purchased, researchers estimated that the number of Macs within the company has reached several thousand.

In general, the Mac has been relegated to a support role within the aerospace industry. It lacks the true multitasking and speed that would propel it into the stratum occupied by workstation vendors such as Sun Microsystems, Inc., Digital Equipment Corp. and Apollo Computer, Inc.

However, the Macintosh became so popular at Lockheed that a number of Mac user groups were spawned by enthusiasts at the company. One, Mike Bailey, a Lockheed systems integrator, is president of the Apple Professionals Exchange, an organization formed last fall for corporate Mac users. He said he hopes the group will attain the stature of Guide or Decus, the corporate user groups for IBM and DEC.

There are about 2,000 Macs at Lockheed's Sunnyvale, Calif., campus, compared with 7,000 IBM Personal Computers and compatibles, Bailey said. In what has become a familiar story at many companies, the Macintosh

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Inside

- Users unconcerned by coming clone shakeout. Page 43.
- Look out for enticing PC retail strategies. Page 43.
- Firm applies PCs to workmen's comp audits. Page 45.

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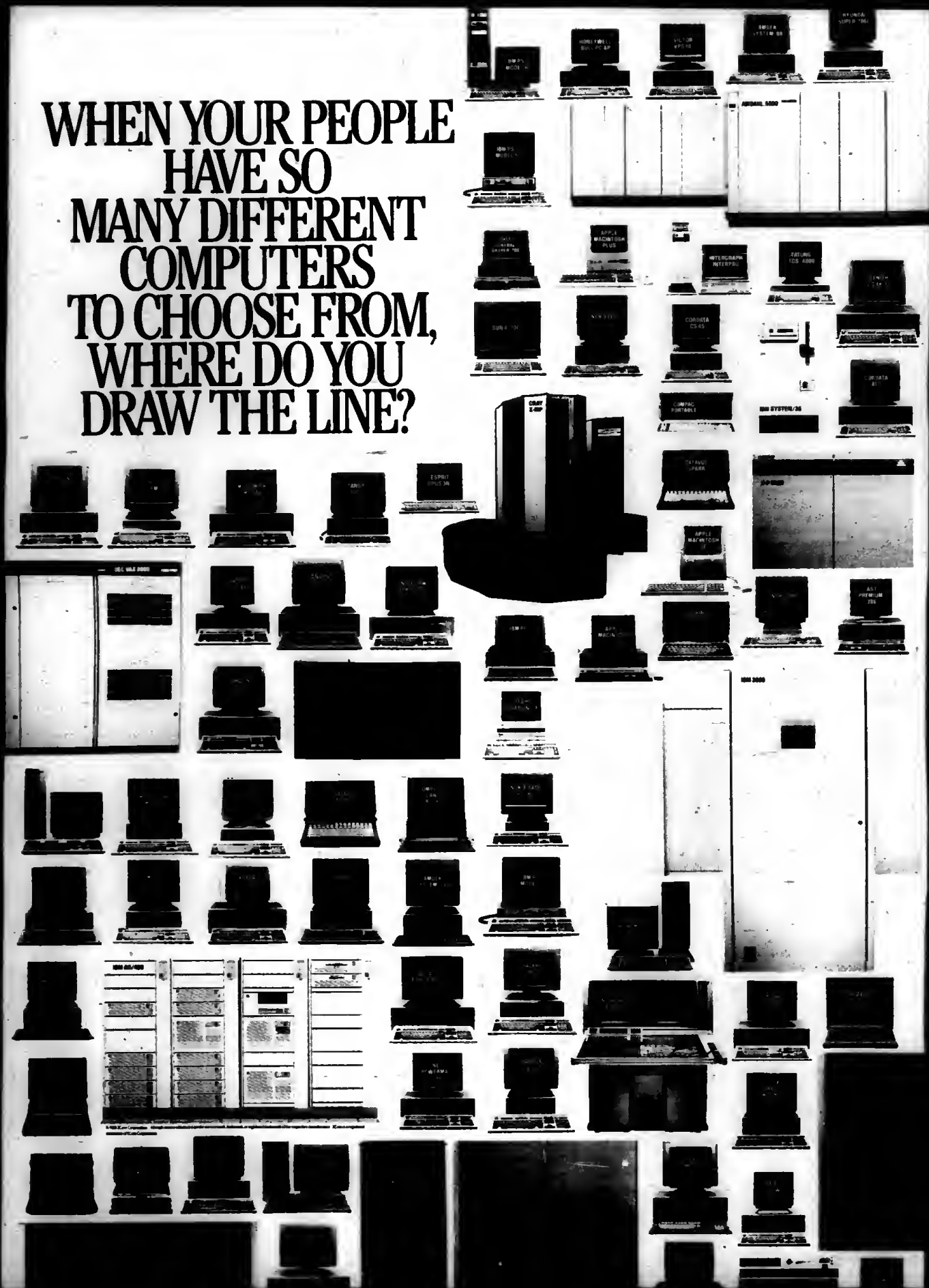

SMALL TALK

Douglas Barney

Pig software threatens to gobble PCs

Battling over pig software. Since the late 1970s, personal computer software vendors have had a huge market all to themselves. That is because mainframe and minicomputer software houses were completely inept at doing two important things: writing packages the common man would enjoy using and squeezing their large products into micro-size spaces.

Fortunately for the big guys, the PC is growing up. At the same time, workstations are becoming increasingly awesome. These things are now powerful enough to run the really big applications, such as host-style database management systems and computer-aided design programs.

The PC software vendors are also lending the large systems folks a hand by legitimizing a new breed of PC application heretofore known as pig software. This is software that is simply too big for reasonably priced computers and would include products such as Ashton-Tate's Dbase IV, OS/2, Lotus' 1-2-3 Release 3.0 and virtually any windows program.

The high-end guys have their own selection of pig software such as Professional Oracle and Decwindows, which we hear gobbles something like 8M bytes of random-access memory. The question is, whose pig software is the best?

Clearly the micro guys are adept at developing programs that humans can actually use. In some cases, people who aren't all that bright can boot a program and get some work done. But the micro folks have less understanding of critical issues such as multiuser access, data integrity, security and data sharing.

In too many cases, the mainframers tout interfaces that are just plain awful. These old-timers do understand the architectures that support real multiuser applications. They also understand DP, MIS, SAA, SNA and lots of other important acronymns.

Elegant interfaces and robust architectures based on host-style computing are equal-

Continued on page 47

Users calm about clone battle

Corporate buyers see no threat to service, support in low-end shakeout

ANALYSIS

BY MICHAEL ALEXANDER
CW STAFF

The go-go years of the personal computer business are waning, and several manufacturers have fallen off the fast track. International Data Corp. (IDC), a market research firm based in Framingham, Mass., predicts that cutthroat competition in the ranks of compatibles makers will lead to a shakeout in the months ahead.

However, few corporate buyers of clones appear concerned that the makers of the machines they own are struggling or unable to provide adequate service and support. It will make little difference which companies prosper and which companies perish, they said.

Nearly all clones are the same under the skin, several buyers pointed out, and servicing them is relatively simple because parts are interchangeable and widely available. What is more important is making sure that the clone is fully compatible with IBM Personal Computers and that the machines deliver on performance and price, they said.

Spalding Sports Worldwide in Springfield, Mass., uses several machines made by Dell Computer Corp., NEC Information Systems and Compaq Computer Corp., among others.

"When we bought them, we wanted to make sure that they were true clones — not close look-alikes but real look-alikes," said Bard White, director of MIS. "Once we got past that, then it was price, service and support."

The fact that a shakeout may be imminent, White said, is of little importance. "It has never concerned us in the past, and we don't see it as a future concern, either," he said. "I have seen companies come and go. Any of the major computer manufacturers will try to make the point that they are always going to be here while leaving the impression that the upstarts may not be. I've heard those words for 25 years. Indeed, there has been a fallout, but it has never affected our ability to service our users."

Not even the top-seeded players in the PC market can be counted on, according to Carlene Harvey, director of information systems at Bangor Hydro Electric Co. in Bangor, Maine: "We started out buying IBM PCs, and they don't sell those any more; then they went to XTs, ATs and now PS/2s, and they're not compatible with anything."

The firm started out as an all-IBM shop but stopped buying IBM PCs "when IBM went the PS/2 route," Harvey said. "That's when we started buying clones — when IBM disappointed us."

The electric utility buys mostly Dell-brand clones and relies on a Honeywell, Inc. service contract to cover service and support.

While David Keyes, second vice-president of marketing and technology at Protective Life Corp. in Birmingham, Ala., is not opposed to buying name-brand clones in principle, he said that they do not offer the degree of connectivity that the company requires. "Buying clones is all right if you are buying onesies and twosies and connectivity is not an issue," he said.

Also, it is easier for a small staff to support end users if all of the machines are the same, Keyes added: "It's not support or the security blanket thing, although they are important considerations, too. But we have a small PC support staff, and the last thing they need is to support 200 different kinds of machines."

Recent news reports about the struggles of some well-known clone makers have convinced him that buying clones can be bad for business, he said.

IDC analyst Bruce Stephen said in a recent report that a "minishakeout" among the lower tier of PC vendors will occur this year. "A quick health report would show Wyse Technology wounded; AST Research, Inc. in for observation of potentially dangerous market decline; Televideo Systems, Inc. and Kaypro Corp. on life support and near death; and Leading Edge Hardware Products, Inc. paralyzed, with the likely result it can recover only to be one-tenth of its former self," he wrote.

A shakeup in the ranks

Among the lower tiers of IBM PC compatible makers, new players move in as old ones shuffle out

	1987		1988	
	Vendor	%	Vendor	%
First tier	IBM	25.9%	IBM	23.1%
	Zenith	7.9%	Zenith	7.4%
	Tandy	5%	Compaq	5.1%
	Compaq	4.9%	Tandy	4.3%
Second tier	AT&T	2.4%	Epson	2.9%
	Leading Edge	2.3%	Packard Bell	2.4%
	Everex	2.3%	Toshiba	2.3%
	HP	2.2%	HP	2.1%
Third tier	Epson	2%	Everex	2%
	Dell	1.8%	Leading Edge	1.7%
	Toshiba	1.7%	Wyse	1.7%
	Wyse	1.7%	NEC	1.6%
	Other	39.3%	Other	43.4%
	Total:	6.1M units	Total:	7.3M units

SOURCE: INTERNATIONAL DATA CORP
CW CHART: JOHN YORK

Vendor-retailer dispute opens door for buyers

BY WILLIAM BRANDEL
CW STAFF

Users planning to buy personal computers from retailers may find the deals more to their liking because heated competition is forcing vendors to be innovative in their selling tactics.

The intensity of the situation has become evident in light of the recent dispute between Compaq Computer Corp. and Businessland, Inc. But while the broken relationship between the No. 1 retailer and a leading personal computer cloner grabs the limelight, IBM is quietly winning the hearts of customers by enhancing its dealer sales, service and support efforts, according to John Dunkle, vice-president of Workgroup Technology, Inc. in Hampton, N.H.

The Businessland-Compaq ruckus has finally settled down, resulting in Compaq pulling its products off Businessland's shelves by April 21. Businessland will continue to support and service Compaq products for a year, but the dispute has given IBM a golden opportunity to play the good guy in the PC distribution channels, according to Dunkle and other analysts.

IBM has implemented three new dealer relationship policies, which include enhanced dealer support, a planned IBM-only distribution plan and an accelerated joint customer-call program. While the jury is out on the two newest programs, the joint customer-call program is regarded as a success.

"There is a clear indication that the program has been profitable for us," said John Hahn, product-line manager at Businessland, which is headquartered in San Jose, Calif. Hahn said corporate buyers have reacted favorably to working out the relationship with the customer, the manufacturer and the retailer together in the same room. Hahn added that the program eliminates the redundancy of having an IBM and Businessland representative calling on the same account.

"What you're seeing is a little more sophistication on our part," said James Cannavino, president of IBM's Entry Systems Division.

Smiling faces

While IBM is now donning what appears to customers to be a friendlier face, the joint customer call program is effectively resolving a channel conflict that was affecting IBM product sales. "There used to be a conflict between dealers and IBM salesmen calling on the same customers," Cannavino said. "We very recently cleaned that up, so we can actually make joint calls [and have] joint planning sessions."

Currently, 90% of IBM's Personal System/2s are sold through dealer channels. But IBM intends to give dealers an even higher profile in the sales effort. IBM is now implementing its Entry Systems Service Amendment, which will almost completely offload the PS/2 service and support efforts into dealers' hands. The company is also placing more money in its Flex Fund, to compete against comparable efforts being made by Apple Computer, Inc. and Compaq. These cooperative funding efforts are intended to train dealers' personnel to exclusively service a given vendor's product line.

But the coup de grace may be found in a bold initiative that IBM now has in beta testing. While stores such as Businessland and Microage, Inc. are now placing greater emphasis on IBM products, IBM is setting up a program with its dealers to exclusively sell IBM products in department store outlets.

The program is in beta testing in some southern U.S. department stores. IBM is expected to formally launch the program before the end of the second quarter of this year.

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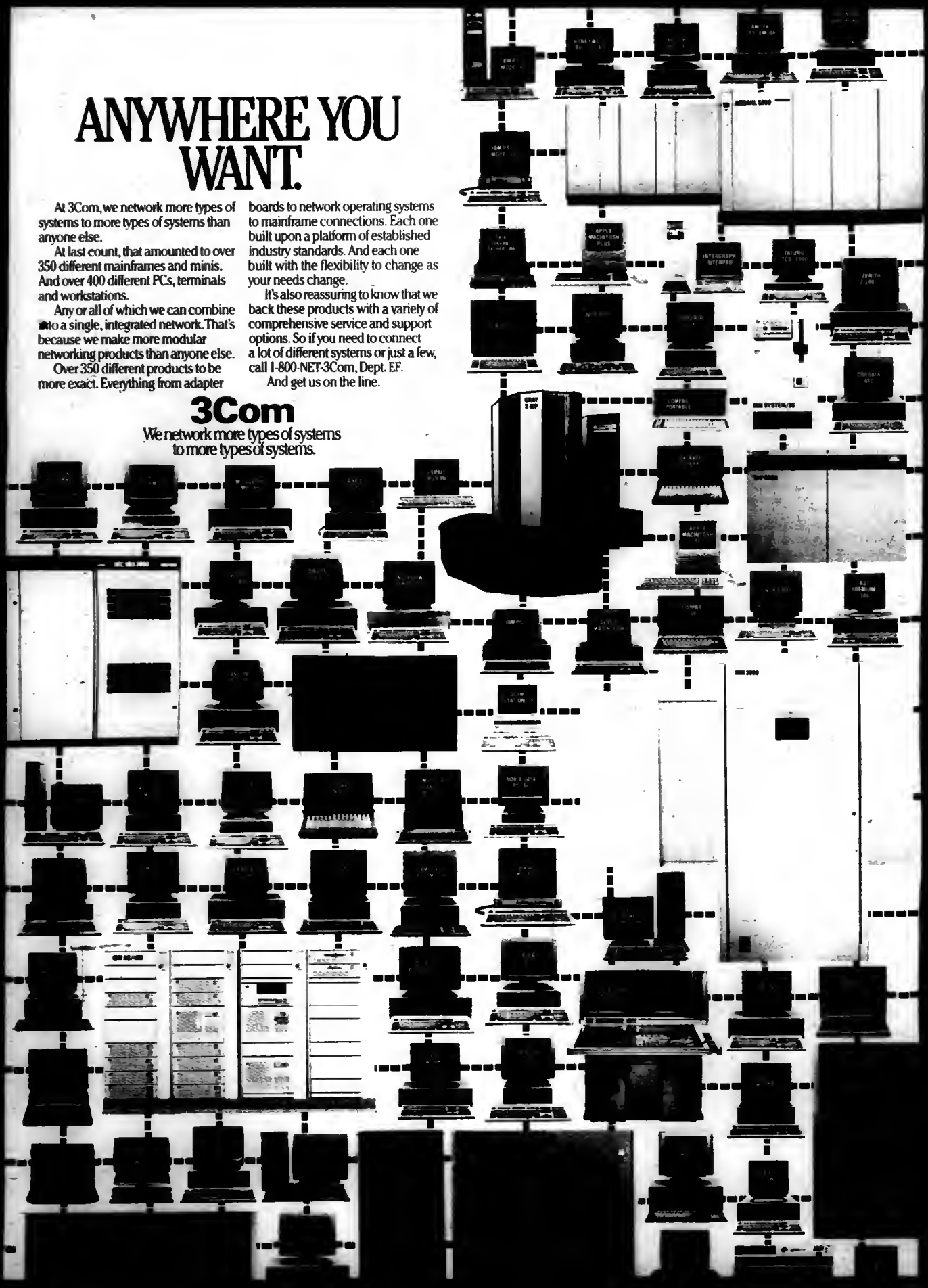


PCs curtail auditing costs

ON SITE

BY PATRICK WAURZYNIAK
CW STAFF

PLEASANTON, Calif. — An application development firm here has found that personal computers are the easiest way to trim the costs of auditing workmen's compensation claims filed in the state of California.

Consolidated Medical Care, Inc. (CMCI), a 3-year-old firm with some 25 employees, uses a local-area network of personal computers along with Borland International's Paradox relational database management system to automate the process of auditing and adjusting workmen's compensation medical bills for insurance companies.

CMCI uses Borland's Paradox Version 3.0 DBMS on the company's network of 14 PCs from Compaq Computer Corp. The company's internally developed application program adjusts compensation claims according to a fee schedule for the state of California.

CMCI President David Abbott said his firm typically saves its clients between 20% and 25% on claims filed in Southern California, while the firm's auditing saves between 15% and 18% on workmen's compensation claims filed in the northern portion of the state.

"We're trying to change the industry," said Abbott, whose company uses Paradox to create the customized PC application program. "With a simple software package and a personal computer, we can do this . . . the PC environment is so much more flexible."

The main benefit of CMCI's application on the PC LAN is the ease of access to data, Abbott said. Using the PC relational database allows CMCI to change and manipulate data for clients easily while also enabling business forecasting with the Paradox 3.0 enhanced graphical capabilities.

"For many, many years, people have said, 'I have all this [mainframe] data, and I can't get to it,' " Abbott said. "Can you imagine all the data over the years in the mainframe? They have no way of extracting that data. We can."

A major incentive for his customers is the cost savings with PCs over the mainframe environment, Abbott noted. That cost factor and the portable nature of his PC equipment gives him an edge over competitors that predominantly use minicomputers or mainframes.

"I don't have to go out and spend a million dollars there, and especially when you go out to sell your software, that's a big barrier," Abbott said. "[The portability] gives us the capability of picking up our entire system here and putting it in somebody's office in Los Angeles or Texas within 24 to 48 hours."

Abbott said the firm's application allows an auditor of workmen's compensation claims to determine facts such as an average fee for a typical procedure and also to trace whether a particular physician is charging too much and overtreating patients.

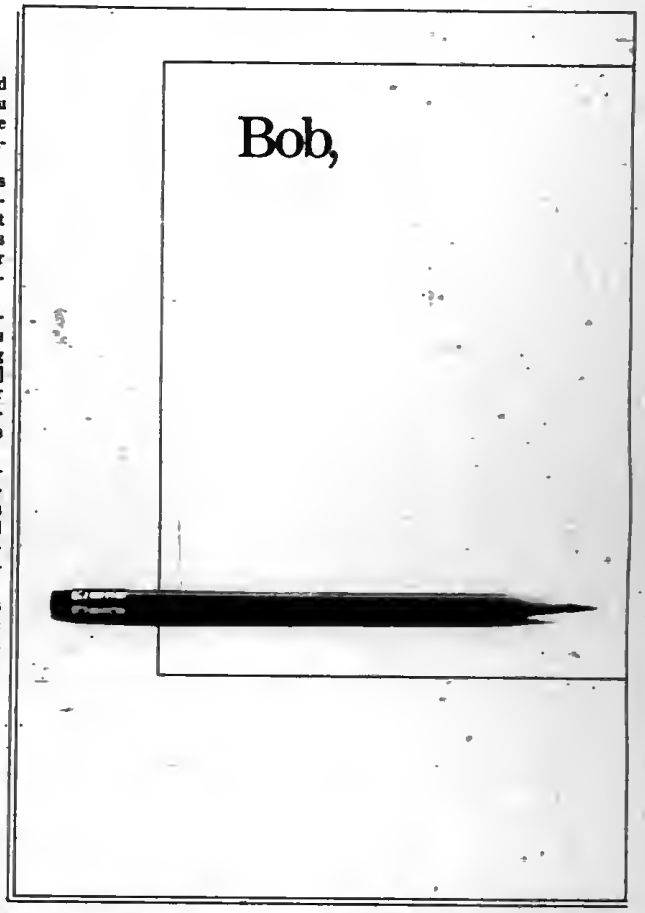
"The neat thing about those pie charts is that you can really manipulate the data," Abbott said. "If they wanted to find out all the fees for a particular ZIP code, they could do it."

Bug repellent

Another reason CMCI went with the PC environment was the ease of use and programming in Paradox's PAL language, which Abbott said allows his programmers to zoom directly to any bugs found in new applications.

CMCI plans to expand the company's scope to other states, Abbott said, noting that the firm currently is beta-testing a system with a third-party workmen's compensation administrator for installation in 23 states.

"We're going to put our hardware and software on their premises throughout the U.S.," Abbott said, "and we're going to use Paradox."



RISC horsepower

CONTINUED FROM PAGE 41

tems based on the Intel 80286 — are expected to plummet to the $1,000 range by midyear, according to Dataquest.

The price delta between the average PC and this new class of workstation is not the only reason users will stick with their 286s and 386s.

The availability of applications software is another reason. Today's RISC workstations run Unix, which offers power in the form of true multitasking. However, the bulk of applications for the RISC-based systems are technical, not the general office applications needed by the typical corporate PC user.

PC users will have access to RISC technology when IBM employs Intel's technology to create a coprocessor for its Personal System/2.

So far, though, IBM has not divulged its plans for marketing this product, informally known as Wizard.

"People aren't going to chuck their MS-DOS applications to get RISC," said Phil Gordon, manager of office automation at Charles Schwab & Co. in San Francisco. "The 386 is here; the 486 is coming. Who needs RISC?"

"The big problem is there's nothing to run on it," Weyerhaeuser's Sund concurred. "Once you get the software developers writing to it, it will sell itself. But how long will that be? Five years? Ten years?"

Sund said Weyerhaeuser may consider buying RISC workstations, incorporating a database engine and using it in place of a departmental minicomputer.

Not so fast

Even a RISC booster like David Newman, a vice-president at Citibank NA in New York, said the bank is not likely to purchase any RISC machines. At least, not yet.

"They perform better, so [RISC] will be on the forefront," Newman said. "I just don't know when."

Where RISC will make its mark is in performance-conscious technical markets. The relatively inexpensive price will allow engineering departments to purchase larger volumes of workstations. "We're looking at a different kind of growth curve because of the price performance these machines offer," Burdick said. "But I'm not sure that we're looking at RISC vs. PC yet."

Macs blast off

CONTINUED FROM PAGE 41

was first brought into Lockheed on the sly by devoted home users. Later, the firm sanctioned its use for desktop publishing. Eventually, the Mac was recognized as a tool for a wide variety of applications. This realization came after Apple introduced a more powerful version of the machine and offered slots for upgrading.

Despite Apple's efforts, the Mac has seen only limited use as a design tool, aerospace users said. During the last 18 months, Apple introduced its version of the Unix operating system, A/UX, for the Mac.

Also, Apple has tried to lure third parties specializing in CAD to port their software to the Mac. Versacad Corp.'s Versacad, which has been a leading CAD package for the IBM PC, was Apple's most notable win. Apple subsidiary Claris Corp. recently introduced Clariscad, a design package for the Mac.

"The whole choice of what system to use is software dependent," said Al Holley, a support specialist for engineers at Hughes' Ground Systems Group. "The CAD software for the Mac is not yet at the point where the Mac would be a choice for our engineers. We're not going to undertake porting software." Although there are 7,000 Macs within Hughes Aircraft, few are being used by the engineers at Ground Systems.

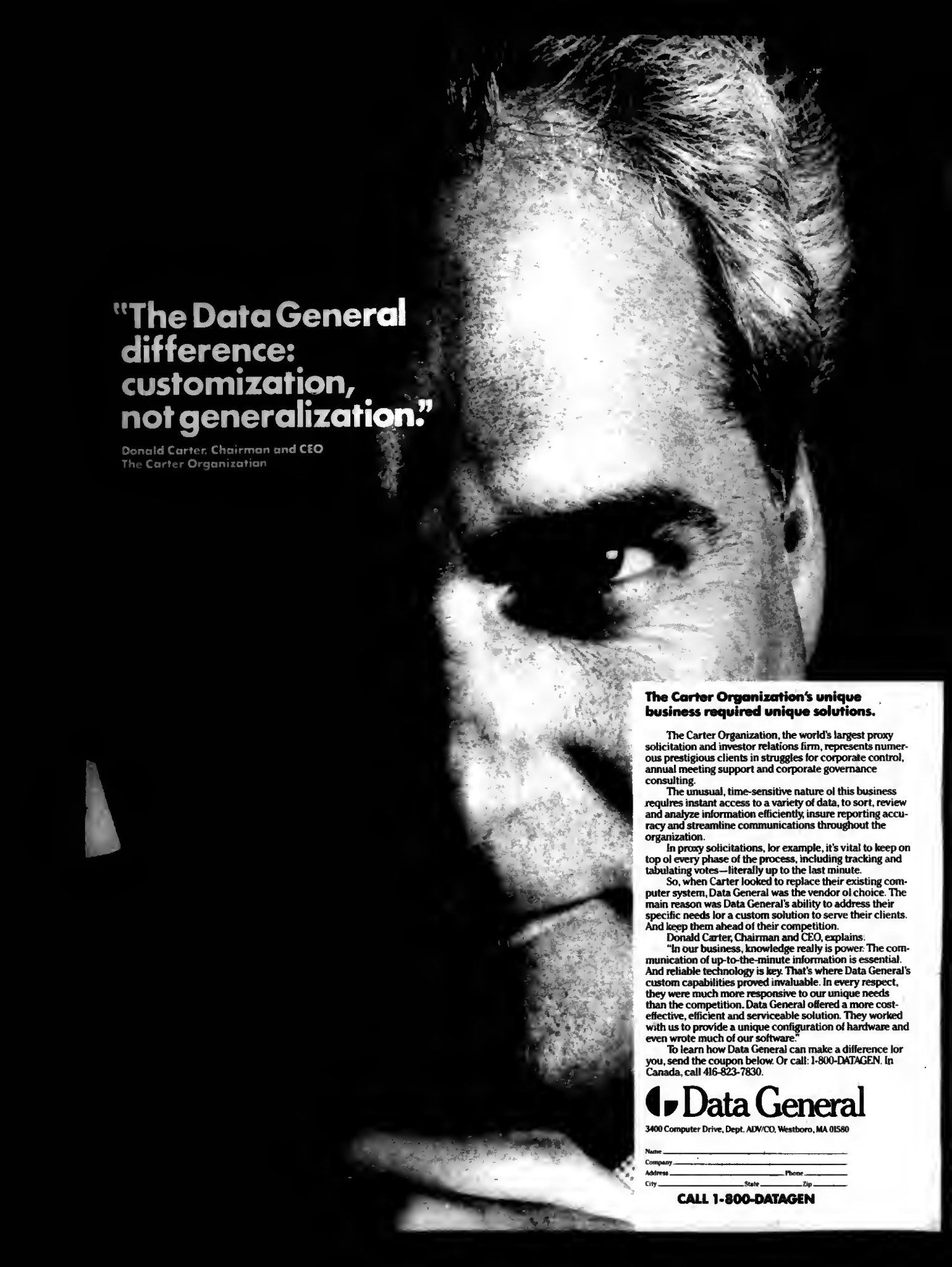
Jack Baumann, manager of end-user computing charged with supporting all Hughes divisions, said Mac use at Ground Systems is typical of how they are being used within the entire company. "As a general picture, the Macs are being used for engineering documentation and in a general support role," Baumann said. "They're not being used much as a design tool. Speed is a problem, and the software is still evolving."

At Lockheed, the Mac has made some inroads as a CAD tool mostly with engineers who do a limited amount of design work during an average day. For them, the Mac is versatile; they can use the graphics for creating reports, presentations and proposals. They can also perform CAD, although more slowly than they would on a more powerful engineering workstation. For the company, the Mac presents a cost savings when compared with a typical workstation from Sun, DEC or Apollo.

"For a lot of us, design work is not everything we do," Bailey explained. "Some are only doing CAD about two hours a day.

"There are certain things a Mac won't do, like high-end mathematical problems that you need a VAX 8700 to run," he continued. "It wouldn't be efficient to do it on a Mac because it would take too long to run."

"These engineers are working in batch mode, taking data changes from the labs," said Frank Smith, a Lockheed support specialist for technical users. "Once the Mac gets multitasking, the Mac will have arrived in the workstation arena. Now it's on the threshold."



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A CAD tool for workstations

BY WILLIAM BRANDEL
CW STAFF

You too can effectively run computer-aided design software applications from Cadam, Inc. on your 32-bit Unix workstation — for $64,000, that is.

That is according to one of the product's first users at the facilities design center at GTE Government Tactical Equipment Systems in Taunton, Mass. GTE is using the Professional Cadam autorouter, an electrical and mechanical design product on an IBM RT workstation. GTE architectural supervisor Donaldo DeChaney said the company will use Cadam to design, lay out and document its building and facilities plans.

DeChaney said her company chose Cadam after looking at several other computer-aided design (CAD) systems because she was impressed with the results she received when using it on a minicomputer. But DeChaney noted that without a $15,000 add-in graphics booster that makes the workstation a virtual minicomputer, Cadam's performance is poor.

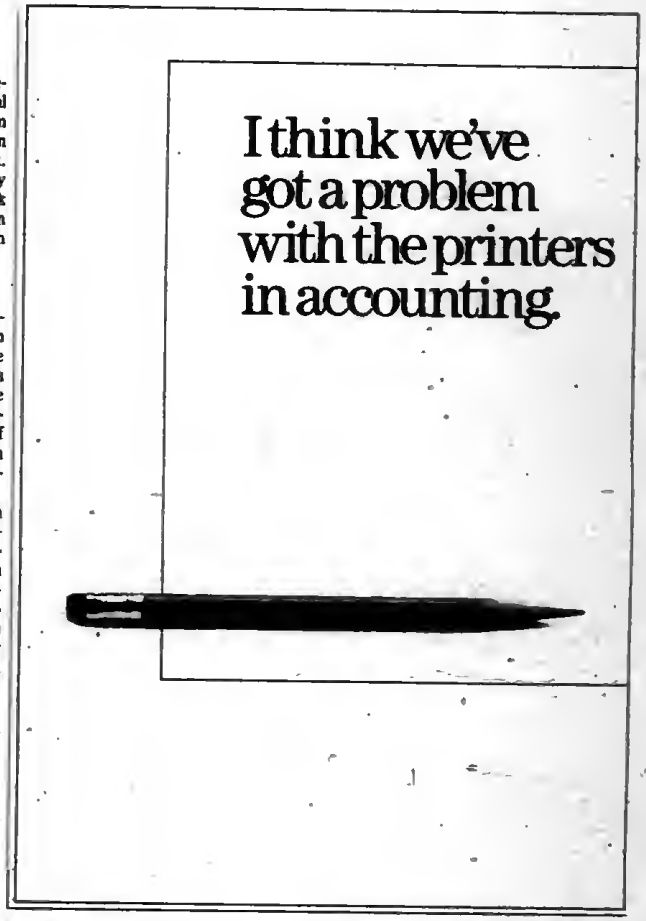
"Without the miniprocessor, I might just as well draw by hand," DeChaney said. "At least that way you don't have to wait. But with the add-in board, it's definitely worth it."

DeChaney is in the middle of an architectural project that calls for her to redesign 75,000 square feet of the tactical sector's office space. She is using Cadam to implement the designs and will then store the "blueprints" on her hard disk. DeChaney notes that she is not strongly computer-literate, but after a one-week course in CAD given by Cadam, she can confidently negotiate her way through the application.

Comparable operations

She said the operations between the Cadam minicomputer and the workstation application are the same. But on the workstation, minus the booster, there is a long wait for her designs to appear on the screen. DeChaney added that the application also requires at least 200M bytes of memory for acceptable performance. In all, DeChaney said, the total system, including the RT, costs $64,000 to run.

The Professional Cadam application was recently ported to Sun Microsystems, Inc. and Apollo Computer Corp. 32-bit Unix workstations. The application was originally designed to run on minicomputers and mainframes and was ported to the IBM RT in 1987. A Cadam spokeswoman declined to say whether the product will be ported to Digital Equipment Corp. or Hewlett-Packard Co. workstations in the near future.



Alexander

CONTINUED FROM PAGE 41

system against intrusion, ranging from setting up audit trails to physically isolating the computer system and limiting access to it. But there is no single solution; nearly all information managers know that it takes a combination of methods to create a fail-safe system.

One measure that companies seldom think about when devising security procedures is the creation of a code of ethics that clearly spells out the company's attitudes about computer security and what the consequences are if an end user violates those procedures.

If an end user duplicates a copyrighted software package, it may not be because he is dishonest; it may be because he is ignorant of the law. This code of conduct can be refined and extended to all end user computing activities, not just to regulation of software copying.

End users need to understand that breaking and entering a computer system is as illegal as popping the lock on the door of a co-worker's office and rummaging through his file cabinets.

"They wouldn't think of going through someone'a desk or notebook but think nothing of going through a disk directory," said Ardoth Hassler, assistant director of the computer center for academic computing at Catholic University of America in Washington, D.C.

Catholic University is among several of the nation's academic institutions that has devised a statement of computer ethics.

That statement, which has been in effect for more than seven years, is published in a variety of university publications, including campus newsletters and handbooks for students — the university's primary end users.

"We saw it as an opportunity to provide guidelines for student behavior on computer systems," Hassler said.

"We wanted to devise the statement and the mechanism to educate the user population about what is considered appropriate behavior," Hassler explained. "If we find an abuse, we take action, but we see it as a preventive measure rather than a corrective one."

Here is a sampling of the standards of behavior that are included in The Catholic University's code of ethics:

- Users must not search for, access or copy directories, programs, files, disks or data not belonging to them unless they have specific authorization to do so.
- Users must not attempt to modify the system facilities or attempt to crash the system, nor should they attempt to subvert the restrictions associated with their computer accounts, the networks of which the university is a member or microcomputer software protections.
- Users should make appropriate use of system-provided protection features and take precautions against others obtaining access to their computer resources. Users should change their passwords frequently and should avoid using their names, their spouses' or friends' names or a password that could easily be guessed.

By itself, a code of ethics will not keep computer systems safe from internal hackers. Not everyone will follow a code of ethics, just as not everyone obeys the law. But at least you will have spelled out the ground rules and the penalties for end users.

"I would definitely recommend it because it educates rather than punishes users," Hassler pointed out. "In the event that we do have a problem, it gives us something to stand on, a foundation on which to base your work or punishment."

Alexander is a *Computerworld* senior editor, PCs and workstations.

Barney

CONTINUED FROM PAGE 43

ly important. Maybe the micro guys can handle large systems issues. Maybe the big iron guns will learn about interactive computing and user interfaces. Maybe through client/server architectures and cooperative processing, the strengths of both camps will be combined. Or maybe

FORTUNATELY FOR the big guys, the PC is growing up. At the same time, workstations are becoming increasingly awesome.

Computer Associates will simply buy the top three PC software vendors and once and for all cram the two worlds together.

A time to whine. Ever notice how computer software creates more paper when it is supposed to reduce paper? Ever open more than one software package at a time? All the loose stuff flying around from one package always gets mixed up with the loose stuff from another. With the bigger programs that come on a dozen or so disks, it's impossible to keep those straight, too. And ever try to stuff the documentation back into the box? You can't.

Then you run into a problem with the spreadsheet program. But flipping through the manual is no help, because the one you pick up talks about word processing. So you grab another and it starts talking about databases.

This phenomenon is clearly holding back sales of laptops. Imagine being on a plane. On your lap is a computer. On your seat tray are manuals. And falling onto your fellow passenger's lap are more manuals. This leaves no room for the most important airline offering — the dry martini.

Graphical, smaphical. While Microsoft continues to pound away at Lotus with its graphical user interface, Lotus Chairman Jim P. Manzi upholds the traditional look of 1-2-3. In fact, he calls Microsoft's graphical zealotry "Software Jihad."

Let's let Manzi explain. "A graphical spreadsheet calculates the same way that a character one does," he said, arguing that it is the underlying functionality that users and vendors should be concerned with.

Lotus, however, still has graphical plans. They are just a mite different from Microsoft's. For instance, the direct keyboard control that characterizes 1-2-3 will carry through, even to Lotus' Presentation Manager-based spreadsheet. If a user hits /FR when using the Presentation Manager product, it will still retrieve a worksheet, Manzi said.

Barney is a *Computerworld* senior editor, PCs and workstations.

NEW PRODUCTS

Software applications packages

A relational database management system for IBM Personal Computers and compatible systems has been announced by FFE Software.

Called FirstSQL, the package reportedly supports ANSI-standard SQL and offers direct access to Ashton-Tate Corp. Dbase files from SQL. Security and password protection facilities are also included. It requires 512K bytes of memory and a hard disk and is priced at $399.

FFE Software
P.O. Box 6417
Albany, Calif. 94706
415-527-4018

A series of disaster recovery planning software systems for users of IBM Personal Computers and compatibles is now available from Strohl Systems.

The Living Disaster Recovery Planning Systems (LDRPS) are available in three configurations and include the following:

- The DRP-EZ Planning System for small to medium-size facilities, including planning, project management and relational database management system capabilities.
- The Single Site Planning System, targeted at large facilities.
- The Multi-Level Planning System for supporting centralized or decentralized data collection activities.

The LDRPS software package is priced from $6,500 and requires a hard disk for operation.

Strohl Systems
5130 Eisenhower Blvd.
Tampa, Fla. 33634
800-634-2016

Scandanavian PC Systems, Inc. has released a style checker program for MS-DOS users.

Readability Plus reportedly checks word processing documents and reports for style consistency. The software program also incorporates nine different writing models, including general-purpose writing, novels, news articles, technical writing and advertising copy. The product can analyze any ASCII file and is currently available at an introductory price of $79.95, the vendor said. The software package normally retails for $94.95.

Scandinavian PC Systems
Suite 1101
51 Monroe St.
Rockville, Md. 20850
301-294-7450

STSC, Inc. has released Version 8.0 of the APL Plus System for the PC, an interactive software tool for solving complex numerical problems on a personal computer.

The software program incorporates the APL language and is especially suited for insurance, financial, engineering and scientific applications, the vendor said.

Version 8.0 reportedly offers support for both the DOS 4.0 and OS/2 operating environments.

The APL Plus System for the PC is priced at $695. For a limited time, the cost of the 8.0 update to current registered users is $150, the company said.

STSC
2115 E. Jefferson St.
Rockville, Md. 20852
301-984-5000

Welcom Software Technology has released Version 3.2 of the company's MS-DOS-based project management package, Open Plan.

According to the vendor, the latest version includes resource scheduling, resource progressing, precedence for logic drawing and support for Ashton-Tate Corp.'s Dbase IV.

All registered Open Plan users who purchased the software package during the past 12 months and users on a maintenance contract will receive copies of the updated product free of charge.

The base price of Open Plan is $4,200.

Welcom Software Technology
No. 275
15595 N. Barkers Landing
Houston, Texas 77079
713-558-0514

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Sequoia Systems, Inc.
3 Metropolitan Corporate Center
Marlboro, Massachusetts 01752
508-480-0800 • FAX 508-480-0184

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Peripherals

Hewlett-Packard Co. has entered the high-resolution personal computer graphics market with the introduction of an intelligent graphics controller and a set of large-screen high-resolution color displays.

The HP Intelligent Graphics Controller reportedly supports resolution of up to 1,024 by 768 pixels and can display 16 colors simultaneously from a palette of 4,096 choices. It is priced at $1,400.

The HP D1187A 20-in. and HP D1188A 16-in. color displays support resolution of 640 by 480 pixels through 1,280 by 1,024 pixels, the vendor said. The displays can automatically sense and synchronize on one of four resolutions preprogrammed into their memory and are priced from $2,795 to $3,695.

HP
3000 Hanover St.
Palo Alto, Calif. 94304
800-752-0900

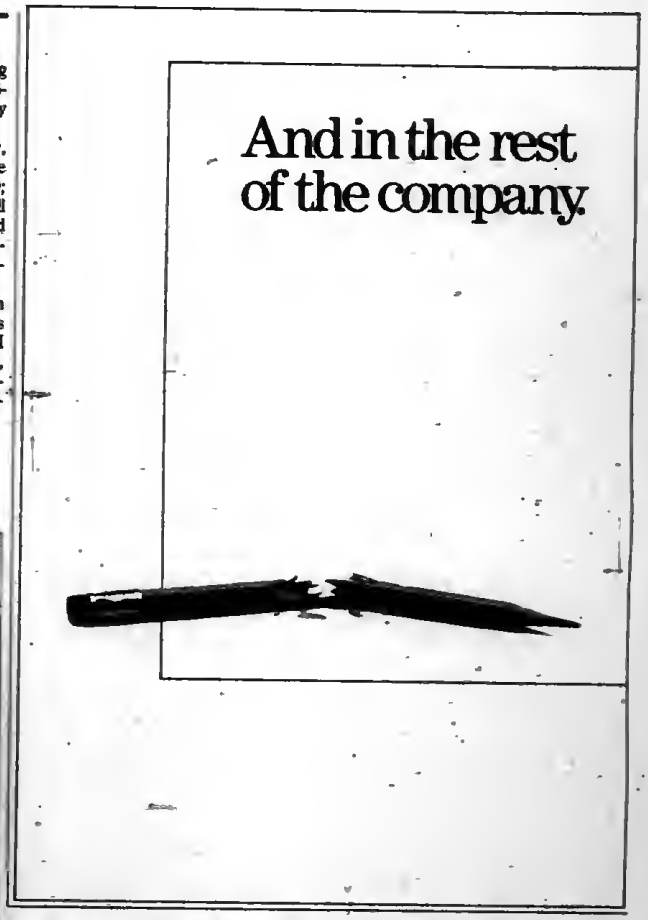
Systems

Dell Computer Corp. has lowered pricing on its Intel Corp. 80286- and 80386-based personal computers, the company said.

Reported to be effective immediately, all Dell PCs with a 90M- or 150M-byte hard drive will be reduced by $300; 100M-byte hard drive configurations will be lowered by $200; and PCs ordered with a 322M-byte hard drive will be reduced by $1,500, according to the company.

The 25-MHz Dell System 325 with an IBM Video Graphics Array Color Plus monitor, a 322M-byte hard drive and 1M byte of dynamic random-access memory, originally priced at $9,099, will now be offered at $7,599, according to the company.

Dell Computer
9505 Arboretum Blvd.
Austin, Texas 78759
512-338-4400



HP's ***Intelligent Graphics Controller and displays***

A trackball device designed for IBM Personal System/2 users has been introduced by Itac Systems, Inc.

Mouse-Trak incorporates a trackball controller and a 2-in. polished phenolic ball that rides on stainless steel shafts, the vendor said.

The product plugs directly into the PS/2's mouse port and is priced at $169 and $179 for two- and three-button versions respectively, according to the vendor.

Itac Systems
3121 Benton St.
Garland, Texas 75042
214-494-3073

A product designed to format floppy disks with extra tracks and sectors to improve space allocation has been announced by Herne Data Systems Ltd.

Maxi Disk 2.0 provides a menu interface for formatting standard DOS disks as well as proprietary extended capacity disks. The product requires PC-DOS or MS-DOS 3.20 or higher and supports both 5¼- and 3½-in. disk drive types. Maxi Disk costs $19.95, according to the vendor.

Herne Data Systems
P.O. Box 714
Station C
Toronto, Ont., Canada
M6J 3S1
416-535-9335

Software utilities

Geocomp Corp. has announced that the Geograf Utilities, previously supplied with each package of the Geograf library of subroutines, can now be purchased separately.

Designed for the engineering community, the utilities provide programmers with device drivers for graphics cards, printers or plotters, the vendor said. The package also includes 13 font libraries, including two Greek fonts for mathematics, and is priced at $75. Discounts are available for quantity purchases.

Geocomp
66 Commonwealth Ave.
Concord, Mass. 01742
508-369-8304

A software program that creates and customizes mailing labels is now available from Pop Computer Products, Inc.

Labels Version 2.1 can store as many as 4,000 names and addresses and includes Help facilities, the vendor said. The package runs on an IBM Personal Computer, XT, AT or compatible, supports most dot matrix, daisywheel, inkjet and laser printers and is priced at $29.95.

Pop Computer Products
1250 Highway 74
Evergreen, Colo. 80439
303-674-0200

Xyquest, Inc. has reportedly developed import and export filters that transfer files between its Xywrite III Plus word processor for the IBM Personal Computer and the IBM and Apple Computer, Inc. Macintosh editions of Pagemaker 3.0 from Aldus Corp.

The Xywrite/Pagemaker filters were designed to ensure that documents could be exchanged between the two programs with basic formatting intact, the vendor said.

The filters are now available free of charge to registered Xywrite users and will soon be shipped with every package of Aldus' Pagemaker, the vendor said.

Xyquest
44 Manning Road
Billerica, Mass. 01821
508-671-0888

Communication Intelligence Corp. has introduced Proficient Autocad Enhancer Release 2.0, which reportedly offers three-dimensional support for Autodesk, Inc.'s Autocad Release 10.

The product utilizes a proprietary recognition utility to enter Autocad commands, third-party software commands, text, graphics and symbols with a single-digitizer stylus, the company said. Multimacro command generation capabilities are also included. The package is priced $649, and the Release 2.0 upgrade is available for $65.

Communication Intelligence
333 Ravenswood Ave. PN257
Menlo Park, Calif. 94025
415-328-1311

OS/2 software

Ideassociates, Inc. has introduced a local personal computer-to-midrange communications product that is reportedly compatible with OS/2.

Ideacomm 5251/OS was designed to maximize OS/2's potential and let users fully utilize OS/2 Presentation Manager capabilities, the company said. The product operates as a Presentation Manager application and offers multiwindow graphics and text display and mouse support. The package sells for $495 and was designed to work with the Ideacomm 5251/Plus board, which is priced from $645.

Ideassociates
29 Dunham Road
Billerica, Mass. 01821
508-663-6878

Prospero Software, Inc. has released Prospero Pascal for OS/2, designed to provide developers with a multitasking protected-mode environment.

The product incorporates a compiler and libraries, and features include a workbench/editor and source-level debugger, the vendor said. The software is priced at $390, the same as the DOS version, and registered users of the DOS version 3.1 reportedly can purchase Pascal for OS/2 at a discount through the end of May.

Prospero Software
Suite 306
100 Commercial St.
Portland, Maine 40101
207-874-0382

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INGRES Query and Reporting Tools are used by a telecommunications company. INGRES reduces the learning curve with easy-to-learn, "fill-in-the-form" interfaces which allow direct access to critical information. INGRES SQL also interfaces with popular programs like Lotus 1-2-3, so users can leverage existing knowledge to become productive right away.

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Support OLTP applications with the INGRES Multi-Server™ Data Manager.

The INGRES Multi-Server Data Manager is the only Relational DBMS to provide scalable OLTP performance across single, clustered, multi-processor, or networked CPU configurations. With its unique AI-based Query Optimizer, INGRES helps one of the world's leading business and consumer electronics companies vastly improve overall system performance.

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Apply INGRES RDBMS power to older file management systems with INGRES Gateways.

INGRES Gateways give a pharmaceutical company direct access to data trapped in an older file system and the ability to combine that data into new relational applications. INGRES Gateways allow access to data across different file formats (such as dBASE III and RMS). No other relational database offers these instant links to older data files.

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CW

Macintosh products

Oracle Corp. Canada, Inc. has announced Oracle for 4th Dimension, an Apple Computer, Inc. Macintosh software product that reportedly integrates Acius, Inc.'s 4th Dimension with Oracle's database and networking technologies.

The software reportedly allows Macintosh users to run corporate databases based on the SQL standard. Scheduled for release in the second quarter, the product carries a price tag of $299, including the SQL interface and both example and tutorial applications. It requires Oracle for Macintosh and 4th Dimension, which are available separately.

Oracle Canada
70 University Ave.
Toronto, Ont., Canada
M5J 2M4
416-596-7750

An eight-slot Nubus expansion chassis for the Apple Computer, Inc. Macintosh SE/30 has been announced by Second Wave, Inc.

The Expanse II/SE30 includes a Macintosh SE/30 direct-slot interface and cable assembly and reportedly allows users to operate eight Macintosh II and IIX Nubus cards with the SE/30 machine.

Scheduled for April shipment, the chassis is priced at $2,295 and offers a one-year warranty, the vendor said.

Second Wave
Suite 260, Echelon II
9430 Research Blvd.
Austin, Texas 78759
512-343-9661

An automatic-line art conversion program for Apple Computer, Inc. Macintosh computers has been announced by Adobe Systems, Inc.

Adobe Streamline was developed to complement the Adobe Illustrator 88 package and will automatically trace bit-mapped images and convert them to illustrator files, according to the vendor.

The files are compatible with Macintosh Plus, SE, II and IIX systems. Adobe Streamline is priced at $395.

Adobe Systems
P.O. Box 7900
1585 Charleston Road
Mountain View, Calif.
94039
415-961-4400

Claris Corp. has introduced Version 2 of its Macproject II project management software for the Apple Computer, Inc. Macintosh environment.

Enhancements to the package reportedly include a multiple-charts feature that lets the user layer several Macproject windows for easier management, tracking and modification of products. The product is priced at $499.

Current Version 1 users can upgrade to Version 2 for $65, and owners of the original Macproject can upgrade to the latest release for $199, according to the vendor.

Claris
440 Clyde Ave.
Mountain View, Calif.
94043
415-960-1500

A graphics spreadsheet for the Apple Computer, Inc. Macintosh computer is now available from Informix Software, Inc.

The Wingz program reportedly offers three-dimensional capabilities, full-color support, text fields with basic word processing functions and the Hyperscript application development language. The package is priced at $399.

Informix Software
16011 College Blvd.
Lenexa, Kan. 66219
913-492-3800

A Fortran editor specifically developed for engineers and scientists is now available from Techalliance.

Running on the Apple Computer, Inc. Macintosh computer, Freditor includes standard Macintosh text-editing features as well as multiple windows, custom Autowrap and on-screen column markers, the vendor said. The software is also capable of generating tables for export to spreadsheets. It is priced at $79.95.

Techalliance
290 S.W. 43rd St.
Renton, Wash. 98055
800-245-8999

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HEWLETT PACKARD

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Hello DE
goodbye ob

Imagine a communications system designed to expand right along with your business, no matter how large you grow or how complex you get. One that offers seamless communication from 40 to 30,000 lines and beyond. And allows you to add lines economically.

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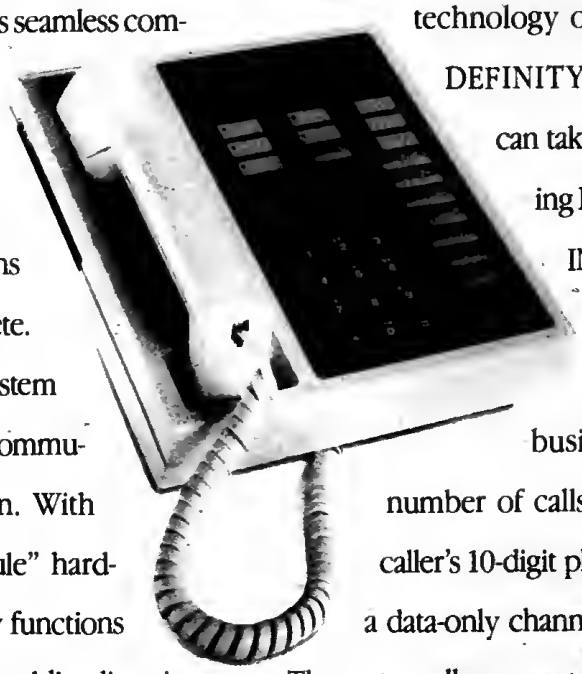
The DEFINITY™ 75/85 system is simply the most advanced communications system you can own. With AT&T's new "universal module" hardware, the first module you buy functions as the system's base. After that, adding lines is simply a matter of adding modules.

AT&T's new high-density circuit packs allow you to add more phones and computers to your system, while requiring less power and less space.



The communication system of the future is fully compatible with the telecommunication technology of the future. With a DEFINITY 75/85 system you can take advantage of emerging ISDN technologies like INformation FOrwarding-2. Especially helpful if your business handles a large number of calls, INFO-2 transmits a caller's 10-digit phone number through a data-only channel to your mainframe. The system allows you to retrieve, then display that caller's history on your screen as you pick up the phone.

Of course, DEFINITY 75/85 systems support the features that have always made

FINITY, solescence.

AT&T communications systems so popular. AUDIX voice mail, for example, offers you twenty-four-hour access for retrieving and leaving messages.

And AT&T's System Management offers you a range of tools, including windowing capabilities, to administer and maintain your DEFINITY 75/85 system.

All of which add up to increased business productivity.

But even as functions such as AUDIX and INFO-2 are added, the DEFINITY 75/85 system's components and operations are standardized, and as simple as ever to operate.

With the DEFINITY 75/85 system you've got the very best in investment protection.

And if you're a current System 85 or System 75 customer, you can upgrade to the DEFINITY 75/85 system while protecting up to 90% of your installed communications investment.

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The right choice.

Before Hiring A Project Manager, It's Wise To Check References.

Computer Associates
Software superior by design.

DATA STREAM

Patricia Keefe

Change can benefit users

No immediate effect. Customers of Sytek can rest easy — at least for a while. The firm, which will become Hughes LAN Systems after its purchase by Hughes Aircraft is finalized next month, says it anticipates no major changes in its distribution, service, pricing or product availability as a direct result of the acquisition. However, Hughes does plan to retire the Sytek logo within four to six months.

Initially, the revamped Sytek will work with Hughes, focusing on enterprisewide networks, and also with Hughes Network Systems, providing private satellite networks. The two claim to have a large number of overlapping accounts.

In the long term, Sytek customers may benefit from the services of Electronic Data Systems, a sister subsidiary of Hughes parent General Motors. In fact, EDS execs were involved in the initial exploratory meetings between Hughes, GM and Sytek officials.

Thanks anyway, but I'll wait for the next version. Despite the army of supporters

Continued on page 57

NCR Comten challenges IBM

High end of new modular processor family boasts one-third more power

BY ELISABETH HORWITT
CW STAFF

NEW YORK — Seeking once again to upstage IBM in the SNA communications processor arena, NCR Comten has announced a modular family of products whose high end is said to provide almost a third more communications power than IBM's top-of-the-line 3745 Model 410.

The NCR Corp. subsidiary introduced a modular, upgradable family of front-end processors. All three can support connections of up to 64 IBM Token-Ring local-area networks and come with 80M bytes of fixed disk storage.

The high-end Comten 5675 is said to support up to 16 mainframe channels and up to 1,024 full-duplex lines and 24 T1 lines. It has 16M bytes of main memory and is priced from $254,000. Also, it can handle about 28% more communications traffic than the IBM 3745 Model 410, according to a Comten internal benchmark test.

IBM "cannot respond at this time" to Comten's claim, an IBM spokeswoman said.

Various capabilities

Announced last year, the 3745 Model 410 features two independent CPUs and can support up to 16 host channel connections, 512 full-duplex lines, 16 T1 lines and eight Token-Ring connections, IBM said. Its pricing starts at $188,000.

The low-end Comten 5655 is said to support a maximum of eight host channels, 512 full-duplex lines, 16 T1 lines and 8M bytes of main memory. It is priced from $122,100 and can be field-upgraded to the 5675 in about four hours, said Comten product management director Kenneth Brantley. Upgrades require replacing the main processor but not regenerating the network software or replacing peripheral devices, be added.

Comten's new line can store up to three alternate Systems Network Architecture (SNA) network configurations on a hard disk. That feature has proven useful to Donovan Data Systems, Inc., said Ronald Block, the firm's vice-president. A New York financial service bureau, Donovan is a beta user of the 5675. Its network, which serves 41,000 terminals worldwide, is "constantly changing — we can do three NCP regenerations a day," Block said.

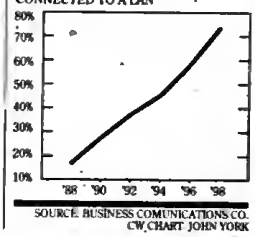
The communications processor's ability to store three alternative Network Control Program (NCP) configurations on hard disk allows information systems to assemble generations on disk while the network is running, then load them overnight or load generations onto unused processors "so they are ready to go," Block said.

Comten's 5675 can store one more generation than IBM's latest NCP release. On the other hand, the NCP gives IBM's communications processors one feature that Comten's products still lack: the ability to handle peer-to peer-communications among PU2.1 devices. While NCR Comten processors can provide host access for PU2.1 devices, they cannot support peer-to-peer communications at this time, a Comten spokesman said.

Data View

LAN explosion

One firm predicts that nearly three-quarters of all data terminals will be connected to a LAN by 1998



SOURCE: BUSINESS COMUNICATIONS CO.
CW CHART: JOHN YORK

Token cuts may incite copycats

BY PATRICIA KEEFE
CW STAFF

Users are unlikely to reap much benefit from two recent price cuts on 4M bit/sec. Token-Ring cards, although it is possible that a handful of vendors will respond in kind to match one of the price cuts implemented by IBM last month.

In a Customer Letter dated Feb. 21, IBM quietly sliced $100 off the price of its 4M bit/sec. Token-Ring adapter for the Personal Computer AT bus, now priced at $650. It has also discontinued production of an earlier model, the Token-Ring Adapter Card 1, a spokeswoman said. A switchable 16- or 32-bit card remains available at $750.

Continued on page 57

No address required

CHELMSFORD, Mass. — Apollo Computer, Inc. has introduced Knowledge Broker, an object-oriented software system that is said to allow end users to retrieve voice, data, video or graphic information, regardless of where it resides on a network or what type of application generated the information.

The program is said to run with or without Apollo's Network Computing System. Third-party applications written to Apollo's new Vendor Display Module interface will be able to access or provide information via the Knowledge Broker, Apollo said. Interleaf, Inc. has announced support of the module.

Knowledge Broker Reader, which allows users to retrieve information, is priced at $550 per workstation. The Publisher's Toolkit option for publishing or engineering professionals, is list-priced at $1,500. Delivery is scheduled for May.

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Financial network hits New York streets

ON SITE

BY ROBERT MORAN
CW STAFF

NEW YORK — A financial information services firm hopes to capitalize on the speed of fiber-optic technology by building a reconfigurable fiber-based network to serve 700 customers spread throughout metropolitan New York.

Track Data Corp. will reportedly fortify its operations and set the foundation for the future this June with a private network called Tracknet. The network will use digital access and cross-connect switches provided by New York Telephone Co. to feed customers' data through diverse routes.

The commitment to fiber optics will give Track Data dollar savings and the opportunity to grow into bandwidths of up to 45M bit/sec.

All stocked up

Track Data provides stock quotations, financial news and information to approximately 700 subscribers in the New York area. The information-intensive business requires the company to send 10M bytes of data to each customer daily.

Currently, the data is transmitted from the company's midtown data center across its 9.6K bit/sec. analog-leased lines to retail and institutional traders that access the resulting charts, graphs, spreadsheets, arbitrages, news and stock quotations from Intel Corp. 80386-based microcomputers in an effort to keep abreast of the financial world.

By changing from those individual analog lines to a fiber-optic network that supports multiple digital 56K bit/sec. lines, the firm plans to conquer two problems: congested communications lines and the vulnerability of its network. The new network will give Track Data the flexibility to automatically reroute communications in the event of network failures.

The seven-year, $7.2 million contract will also save Track Data money, according to President Barry Hertz, who said the company would have paid more for the analog services during that seven-year period.

Although Track Data's analog system meets most of the company's daily needs, there is one key time when customer demand overwhelms the 9.6K bit/sec. capacity.

"The analog system becomes inefficient at the opening of Wall Street — at 9:30 a.m., volumes tend to back up," Hertz said.

More critical, Hertz said, is the need for immediate backup for Track Data's operations. "The key is not just to have the data," he said. "Ninety-five percent of our problems are related to communications. If the system goes down, traders have no use for you."

Track Data's Hertz *following operations*

With the new fiber system, Track Data will switch its computer operations from Manhattan to Brooklyn and maintain the Manhattan center as a backup site. In addition, the company will improve network reliability by having its customers access data through two diverse routes.

Customers will receive multiplexers that will link them with the fiber network via an ordinary telephone line hookup to New York Telephone's switches.

The Brooklyn data center will serve as Track Data's main site and will be connected to two New York Telephone fiber centers in that borough. Those centers will have redundant paths to Manhattan.

Since the Manhattan data center will serve only as a backup site, it will be connected only to New York Telephone's downtown hub. "But if a problem occurs in Brooklyn," Hertz said, "operations can be immediately switched to Manhattan."

The contract calls for the backbone to be built by June, and the company plans to bring customers onto the network throughout the year. Hertz said that three sites will test the system in June. In addition, what Hertz referred to as a larger "digital pipeline" will allow the company to offer customers more functionality.

Although Hertz declined to offer specifics, he said, "In the future, the company would look to bring customers image database technology, which requires the larger digital bandwidth." Once the system is tested, it will serve as a template for other Track Data offices in Chicago, Philadelphia, Boston, Los Angeles and San Francisco, according to Hertz.

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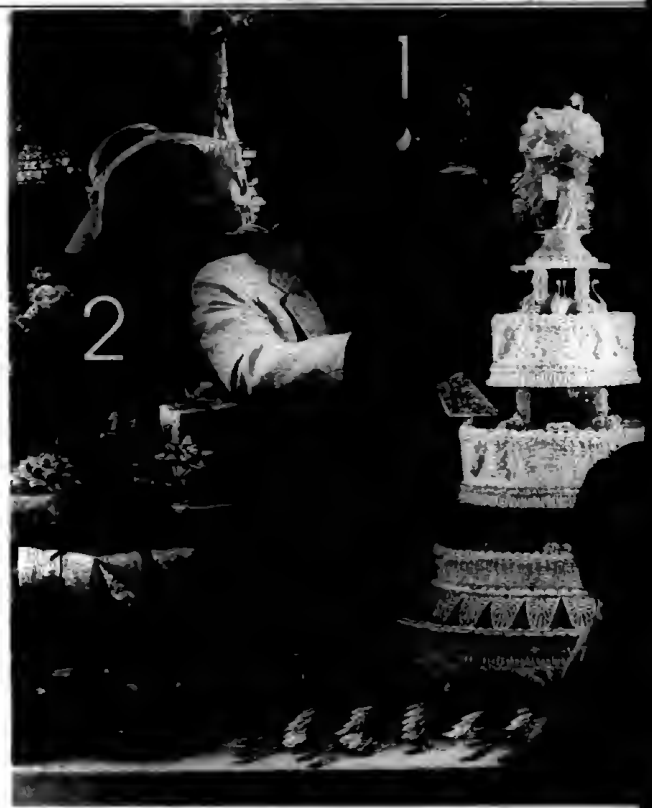

You may know us as an aerospace company, but you'd be surprised at how many different ways McDonnell Douglas

Keefe

CONTINUED FROM PAGE 55

currently backing Novell's Portable Netware answer to Hewlett-Packard's LAN Manager/Unix, some observers prefer to wait for Netware 386.

First, it is worth noting that not all Portable Netware supporters are actually committed to licensing the source code. Some of that support translated into commitments to develop compatible applications, statements of support and promises to evaluate the technology.

Second, there are those — for example, John McCarthy, research director at Cambridge, Mass.-based Forrester Research — who maintain that "Portable Netware is first and foremost a marketing move to dispel the notion that they are a closed system." McCarthy agrees with many current Netware users who believe that Netware 386, which ships later this year, is more key to users' long-term strategies.

HP gets it together. While Novell watchers take a wait-and-see stance on Portable Netware, Hewlett-Packard, with its Unix and OS/2 LAN Manager strategies mapped out, is racking up the kudos. HP's approach is targeted more at HP 9000, Officeshare and Starlan users. LAN Manager support for the HP 3000 minicomputer family, which uses a proprietary operating system, is in the planning stages.

That's good news for users such as St. Paul, Minn.-based 3M, which has a distributed network based on the 3000 but is considering a switch to Unix.

"What they've ended up with is an offering that allows the customer to choose whatever [operating environment] that they are comfortable with," says David Terrie, president of Newport Consulting in Salem, Mass. At the same time, no matter what the customer goes with, he won't be stuck, he added: "If they change their mind, [HP's approach] will easily move with them."

Doug Gold, an analyst at market research firm International Data Corp. in Framingham, Mass., says, "HP probably has the most coherent mini, mainframe and PC strategy, bar none. They seem to understand what we hear end users asking the most for." By that, he means a coherent strategy that incorporates existing applications and processor environments into emerging personal computer and local-area network applications and environments.

"You don't really see that from DEC," Gold says. Time will also tell whether we ever see it in action from HP.

Users also stand to gain if HP is successful in encouraging developers to build integrated OS/2- and Unix-based programs.

Plugging the holes. Of course, HP has not taken to the open road out of the goodness of its heart. Analysts have correctly noted that HP does not have a strong hold on either the PC or PC network markets. Its LAN Manager strategy could help reverse that situation. "HP has got to provide LAN and client services on a lot of the popular LAN platforms," says David Perro, an industry analyst at Dataquest, a market research firm based in San Jose, Calif. Doing so should play well in accounts that have a lot of unconnected PCs, such as Allied Signals, he says.

Don't be surprised if HP, despite its stake in 3Com, decides to license Portable Netware. Although HP is a key LAN Manager OEM, Ormond Rankin, HP's product marketing manager of PC Networks, admitted the vendor will probably be forced to support Portable Netware by customers such as American Airlines, which has a large Netware installed base. American just awarded HP a huge contract.

Keefe is a *Computerworld* senior editor, networking.

Token cuts

CONTINUED FROM PAGE 55

More recently, Racore Computer Products, Inc. in Los Gatos, Calif., created a stir with dramatic pricing on its 4M bit/sec. Token-Ring cards. Racore cut prices on three models: The eight-bit costs $399, down from $540; and the 16-bit and IBM Micro Channel Architecture cards cost $499 each, down from $740 and $640, respectively.

A survey of Token-Ring vendors revealed that most contradict Racore's anticipation that many will follow its lead. However, a few said they may respond to IBM's price cut.

The $650 sticker price is a significant lowering of the price umbrella, said William Swift, 3Com Corp.'s product line manager. 3Com sells a 16-bit 4M-bit card for $595, which is still cheaper than IBM's eight-bit card. Even so, Swift said he would be more comfortable with a greater price differential and is considering a price cut.

Overall, vendors were quick to crush the thought of any widespread price-cutting on Token-Ring cards. They unanimously rejected Racore's contention that prices have held back Token-Ring sales. The average 4M bit/sec. Token-Ring card costs $700, compared with $450 for 10M bit/sec. Ethernet.

Observers said Token-Ring sales are actually galloping along at a steady clip in their primary market, which is composed of large IBM Systems Network Architecture-oriented shops. Most market research firms contend that despite its higher per-connection cost, Token-Ring will continue to increase its share of the market — a point that Racore conceded.

In addition, price is seen as less of an issue in these shops when compared with interoperability with IBM equipment and service and support concerns.

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Sydney unveils tool for CCITT E-mail

BY ELISABETH HORWITT
CW STAFF

VANCOUVER, B.C. — Following hard on the heels of archrival Retix Corp., Sydney Development Corp. has released software that is said to comply with the CCITT electronic-mail directory standard X.500.

Sydney's recently announced Directory 500 is said to implement all available X.500 recommendations for setting up an Open Systems Interconnect Directory, the company said. The directory is designed to keep track of user addresses for all E-mail systems that adhere to the CCITT X.400 E-mail standard.

X.500 still lacks certain functions such as the ability to automatically keep track of address additions and changes across multiple E-mail services and systems, according to Steve Caswell, an independent consultant and vice-president of Incomnet, Inc., a Westlake Village, Calif., network integrator. But even given the lack of such sophisticated features, vendors such as Sydney can create functional systems based on the existing standard, he added.

In any case, users may decide to deal with this problem as they now deal with facsimile transmissions — by calling first to ask for the right log-on name and address and keeping a list of frequently used addresses, Caswell said.

More to come

Sydney plans to provide additional features as soon as standards exist for them, according to Sydney Chief Operating Officer Peter Westwood.

One of the most useful functions X.500 will provide, according to Caswell, is coordination of electronic data interchange (EDI) transactions. Since EDI networks tend to be limited to a small number of frequent trading partners, companies can maintain an X.500 service that routes transmissions to the right destination once a simple destination code has been entered "so you won't need public electronic-mail services when EDI becomes available," Caswell added.

Directory 500 allows users to browse through directories for addresses, obtain E-mail addresses even with incomplete identifying information, verify an address and ascertain the data communications capabilities of the recipient, according to Sydney.

The vendor plans initially to sell Directory 500 to software and systems vendors and value-added network services, with large corporate users a future target, Westwood said.

Enhancements noticeable

Sydney also announced an update of its existing X.400 product that reflects enhancements made recently to the X.400 standard, Westwood said.

As a result, instead of requiring IBM Personal Computer users to receive all of their mail directly — which is impractical for a single-tasking PC, Westwood pointed out — PC users can pick up their mail any time from a host or network server that has been designated as their message transfer agent.

Both the X.500 product and X.400 enhancement are available immediately. Directory 500 pricing starts at $150,000 for the source-code version, including the right to make user copies, according to Sydney.

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AT&T slashes digital service prices up to 74%

BASKING RIDGE, N.J. — Seeking to fend off inroads from price-cutting competitors, AT&T has announced price reductions of up to 74% for Accunet Switched Digital Service, which provides 56K or 64K bit/sec. digital lines over the public-switched network.

"Services announced by our competitors are priced significantly lower than AT&T's," company spokesman Daisy Ottman said. "We need to lower prices to retain our customers and encourage users to try the services."

Both MCI Communications Corp. and U.S. Sprint Communications Co. offer switched digital services at prices lower than AT&T's.

The price-slashing became economically feasible for AT&T because of the increasing availability of digital switches on the carrier's network, which has eliminated the need to dedicate individual circuits to digital transmissions to guarantee users an end-to-end digital network, Ottman added.

The changes to the Accunet Switched Digital Service are expected to take effect April 18.

AT&T has also filed a tariff to extend the reach of its Accunet Packet Service through connections to Bellsouth Corp.'s Pulselink regional packet-switched service. AT&T already has similar arrangements with Bell Atlantic Corp., Cincinnati Bell and US West.

MANAGER'S JOURNAL

EXECUTIVE TRACK

David P. Weber has been appointed director of the computing and telecommunications division at the U.S. Department of Energy's **Argonne National Laboratory** in Argonne, Ill.

Weber was previously manager of the computing services department. In his new position, he is reponsible for the operation of Argonne's central computing and telecommunications facilities, research and development in advanced scientific computing and telecommunications technologies and management information systems.

Weber joined Argonne in 1974. He holds a master's degree and doctorate in nuclear engineering from the University of Illinois and a master's degree in business administration from the University of Chicago.

.....

William S. Albert has been promoted to vice-president of MIS at **Poser Business Forms, Inc.** in Fairhope, Ala. Albert was previously director of information systems. He joined Poser 15 years ago as data processing manager and holds a business degree from the University of South Alabama.

.....

L. Hoyt Griffith has been promoted to senior vice-president at **Dominion Bankshares Corp.** in Roanoke, Va. Griffith is manager of Dominion's retail electronics services and is responsible for setting the direction of Dominion's electronic banking functions.

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Who's on the go?

Changing jobs? Promoting an assistant? Your peers want to know who is coming and going, and *Computerworld* wants to help by mentioning any job changes in Executive Track. When you have news about any staff changes, be sure to drop a note or have your public relations department write to Clinton Wilder, Senior Editor-Management, *Computerworld*, Box 9171, 375 Cochituate Road, Framingham, Mass. 01701-9171.

Former N.Y. cop walks systems beat

National's streetwise CIO calls the information systems shots as he sees them

BY ALAN J. RYAN
CW STAFF

Streetwise, scrappy and prematurely white-haired, Jack Livingston looks more like a cop than a chief information officer. In fact, he's been both.

Following a 15-year career at the New York City Police Department and a few years working at an independent systems consulting firm, Livingston landed at National Car Rental System, Inc. last fall as its chief information officer. He had previously worked with Minneapolis-based National for two years as a systems consultant.

Livingston still speaks with a strong New York accent and retains at least some of his street-cop flair. "He's like a butterfly, always moving around the building," says Tom Barton, director of telecommunication services.

"I look at Jack as being a business partner: an individual who is able to give me a very clear understanding of what is required" in systems, says Chief Executive Officer Vince Wasik. He can even explain nanoseconds, Wasik adds, in a manner in which "all of a sudden, people begin to say, 'I think I really understand what the computer system can do for us.' "

The 50-year-old Livingston says his ability to explain things in simple terms stems from the fact that his intended career was the police force, not information systems. "I never developed a real loyalty to the profession like a lot of DP people do," he says. "My loyalty and my reason for being was to make this tool work for the benefit of the police department."

Survival is the name of the game in the car rental industry, and Livingston says that systems are a competitive tool that must be used wisely. He can be hard-nosed if projects demand tight deadlines, he admits. However, he doesn't always play the cop. If deadlines are loose, he can be fairly relaxed as well.

"One of Jack's favorite lines is, 'We have to manage on air currents because things change so rapidly that if we put little walls around us and pretend that everything is well-structured, we are not going to survive,' " says Mike Accurso, vice-president of information systems.

Like a beat cop, Livingston is constantly talking to people around him, checking the atmosphere. "He catches you here and there and asks you how it's going and what you're working on," says Greg Nelson, director of planning services.

Livingston's influence at National goes straight to the top. "Over the last few years, Jack began teaching me that information systems should really be a phenomenal asset to the CEO rather than something that is so technically oriented that one can never get close to it and never totally understand it," Wasik says.

Continued on page 61

PROFILE: Jack Livingston

ALVIS UPITIS

Position: *CIO, National Car Rental System, Inc.*
Mission: *Building systems that will boost National's presence in the rental car industry*

Harmony in the workplace wins its reward

BY CLINTON WILDER
CW STAFF

The successful implementation of information technology for strategic advantage demands a symbiotic relationship between information systems management and senior executives — one side cannot succeed without the other.

That is the premise behind the third annual Partners in Leadership Awards to be presented by the Society for Information Management (SIM). The seven-member SIM selection committee will choose from companies nominated during the next two months on the basis of how well their IS and business management have worked together to forge marketplace success.

TOM MONAHAN

"Nominees should be companies that have done something new or different with the application of IS that enhances their competitive advantage," SIM spokesman David Laurenzo said. "But that application must also involve the senior-most executives in the firm."

The four winners in the past two years were honored for implementing an on-line order entry system at Lithonia Lighting; a handheld computer system for the sales force at Frito-Lay, Inc.; a revamped sales system using handheld computers and personal computers in a unit of Sara Lee Corp.; and a multifaceted program involving executive PCs, expert systems and sales force laptop computers at Du Pont Co.'s Medical Products Department.

The 1989 selection committee members include IS executives Peter W. C. Mather at Air Products & Chemicals, Inc., Thomas E. Morin at Medtronic, Inc., John Owens at Sara Lee and Alan Deering at Pepsico, Inc.; business professors Jim Cash at Harvard Business School and Brandt Allen at Colgate Darden Graduate School; and IS consultant Richard Dooley at the The Dooley Group.

Nominators may nominate executives in their own firms or in another firm. Nominations must be sent no later than May 30 to SIM, Suite 100, 111 E. Wacker Drive, Chicago, Ill. 60601. Winners will be named Aug. 15 and awards presented Sept. 25.

TAKING CHARGE

Anthony Reed

Model project teams help hold on to workers

Employers today are faced with the same decade-old problems: how to keep valued, promotable employees when the employees cannot move up the ladder, how to institute departmental changes without adversely affecting morale and how to improve productivity and quality with shrinking budgets.

Unlike some industry-specific professions, such as petroleum and aeronautic engineers, information systems professionals are more mobile. We can switch from working for a depressed oil company to a profitable life insurance company in one job change.

As one manager said, "There aren't any nails holding a programmer's foot to the company's floor to keep him from moving." This mobility has earned us the title of The Technical Nomads of the '80s.

THE TEAM'S makeup should reflect a broad range of experiences — from novice programmers and experienced new hires to veterans.

Since IS owes its existence to other disciplines such as engineering, mathematics, business and philosophy, it seems logical that we borrow from them to solve some of our problems. Combining quality-circle and engineering-prototype-model concepts into IS model project teams provides an inexpensive, high-impact solution that reduces turnover, improves productivity and quality and decreases change-related anxiety.

Briefly, a quality circle is a group of employees who identify problems that hamper their productivity, determine the problem's causes, develop a solution and make recommendations to management.

The circle lets employees participate in the decision-making process in areas that directly affect them. It gives them a sense of responsibility and ownership as well as a feeling that management cares about their opinions. This technique is successfully employed by the Japanese.

Engineering prototype models are used to test new production methods prior to spending millions of dollars to implement an unproven method. The workers' feedback is critical to the system's success.

If management fails to respond to their recommendations, they may rebel against the changes and cause a decrease in productivity and quality. Many of us have experienced this when we have installed systems that fit our requirements — but not the user's.

The model project team consists of four to six temporary members, preferably one from each existing project team, and the technical support functions. The team stays together for three to six months before new members replace the members.

The team's makeup should reflect a broad range of experiences — from novice programmers and experienced new hires to veterans.

The entire team benefits because it is actively involved in quality and productivity improvements and decision making. Management benefits because the team members will have better morale, higher self-esteem and a sense of ownership. The members become problem solvers instead of problem employees.

The team can also be used as an independent testing, quality assurance or advanced technology group if a project is unavailable.

During the tenure of the team, members are trained in system life cycles, testing tools and techniques and departmental standards. They are also exposed to the latest technology such as computer-aided software engineering methodologies, programmer workbenches, personal computer-based tools and fourth-generation languages.

They also learn about presentation skills, time management, business writing and the user areas. The more they know about the company's business and the better they can communicate, the better they can design systems to satisfy the users.

The model project team gives project leaders the opportunity to take management-related and technical seminars to sharpen their skills. Also, it gives management a chance to evaluate the project leader's replacement.

The model-project-team concept keeps the staff from getting stale and lowers turnover. Teams' solutions improve quality and productivity — and the department gets a group of workers who feel committed to solving problems.

Reed is director of business systems at the Dallas County Community College District.

Why spend money on computers when you can make money on computers?

UN

Former N.Y. cop

CONTINUED FROM PAGE 59

It was the acknowledgment that the computer is a tool for business and not solely a means to achieve career success for himself, Livingston says, that put him in good favor with business people.

Another factor in his success, he says, is his ability to use the computers of today and recognize their potential. "There is really not anything new happening here," he says. "It is just somewhat exotic the way we use it."

National is primarily an IBM shop and is slated to upgrade to two IBM 3090 Model 300S machines this summer. One requirement agreed on by Wasik and Livingston is that the company never exceed 50% of its CPU capacity, a requirement that forces planning for the future.

Initially, National was a company that "kind of picked up other people's leftover business and was quite comfortable being No. 3 for a long time," one employee said. Now it is striving to be No. 1.

Since Livingston has been with the rental firm, the following customer-oriented programs have been implemented under its Electronic Advantage system:

- **Emerald Club:** Members pay $50 per year to hold credit card-like Emerald cards that entitle them to all of the National services, including Emerald Aisle. With membership, they can earn points toward travel and merchandise awards.
- **Paper-Less Express:** National claims it has the industry's shortest, easiest-to-read rental agreement.
- **Emerald Aisle:** Available at most major airports, the service involves no paper. Renters go straight from their planes to the Emerald Aisle, select their cars from a selection of ready vehicles and drive to a booth where they slide their Emerald Club cards through a card reader, present their license and leave.
- **Smartkey:** Just installed this month, the system allows preferred customers to complete their own rental transactions at machines similar to bank automated teller machines. After sliding the Emerald Club or privilege-preferred card through a slot and following touch-screen commands, the machine automatically releases car keys into the driver's hands.

Now he stakes out systems

His New York accent is still strong, but not so Jack Livingston's ties to the early days of his career, which had him serving as a beat cop on the streets of Harlem, Brooklyn and midtown Manhattan.

In his last stint on the streets, Livingston was operating on a plainclothes task force of the New York Police Department (NYPD) vice squad in midtown Manhattan.

He recalls what prompted his changeover: "I woke up one morning in a rather dingy place that was owned by the city, looked out the window and said, 'What am I doing here?' "

The very next day, he began looking around within the NYPD for another job. He stumbled into systems because data entry operators were needed to help install New York's 911 emergency communications system. "I'd never seen a computer before I got that data entry job," he says.

New beat

After only three days on the 911 project, Livingston applied for and was accepted in another assignment — this time as a night-shift computer operator for the department.

"The police department has always got an idea that if they have to do something, there is somebody on the job that can do it. They throw a book at you, and you learn it," he says.

Learn it he did. Livingston spent 10 years in DP and retired after 15 years on the force, holding the rank of sergeant. Before long, he found himself back in the NYPD designing new systems, but this time he was working for a private consulting firm.

Later, he was hired by consulting firm DLA Associates as its director of criminal justice systems. It was there that he met Vince Wasik, a former Hertz Corp. official who was on the acquisition warpath.

Wasik's investment group, Fidelco Capital Group, purchased National Car Rental from Household International with the help of Paine Webber, Inc. in December 1986.

In the fall of 1988, Wasik organized a management-led buyout of the firm and extended ownership to 70 employees, including Livingston.

In his personal life, Livingston spends a lot of his time in the air, commuting on a weekly basis between Minneapolis and his home on Long Island, New York. Livingston has a wife and two sons.

ALAN J. RYAN

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At 75% over budget, state questions tax system savings

BY J. A. SAVAGE
CW STAFF

SACRAMENTO, Calif. — After exceeding its budget by 75% and delaying final implementation by two years, long-term cost savings from California's tax automation system are in question, according to a California Auditor General's report issued late last month.

California is the second state to document major cost overruns in automating its tax system. In 1985, Michigan also incurred major overruns on the same type of automation system. Both were implemented by Arthur Andersen & Co.

However, the Employment Development Department (EDD), the state department responsible for the project, has taken joint responsibility with Arthur Andersen for excess costs and late implementation. The EDD has defended its use of the consultancy rather than attempting to develop systems in-house.

The total cost of the system for California taxpayers is $12.7 million, including a cost overrun of $5.4 million. Along with a 23-month delay in implementation, there was a delay in tax collection of up to $700 million. According to the report, because of that delay, the state did not earn at least $1 million in interest.

The EDD is responsible for collecting revenues whose amount is apparently second only to the Internal Revenue Service. One single application is reponsible for collecting $13 billion through employee withholdings each year.

Deadlines, deadlines

One source close to the original implementation blamed the two-year delay on a rabid push for meeting deadlines.

"Arthur Andersen knew about bugs in advance, but they chose to meet deadline," said Paul Epps, currently chief of MIS at the state's Department of Social Services. Epps formerly worked at the employment department. Other department personnel, who wished to remain anonymous, concurred with many of Epps' charges.

"I never saw anyone push so hard for deadlines before," Epps said. "If you had work on your desk and it was due Friday, they'd take it off the desk, even if it was only half finished."

"They didn't get paid until they delivered the product," said Steve Schutte, manager of the audit project.

Arthur Andersen did get paid $5.2 million in August 1987, according to the state report. After payment, however, the contractor had to return to iron out bugs until mid-1988.

"While there was a fair amount of business pressure driving toward timely implementation, we wouldn't have put things into operation before they were ready," said Mike Hudson, a partner at Arthur Andersen.

Nearly $2.7 million of the cost overruns are attributed to contract amendments with Arthur Andersen, Schutte said, doubling the amount of the contractor's original payments. However, the employment department contends it is money well spent.

"I don't view the contract amendments as cost overruns," said John Healy, deputy director of the department's administrative branch. He said that instead, the amendments were for extras that were requested and delivered.

Despite the auditor's findings, Hudson maintains that the automation systems are successful. "Benefits have exceeded costs," he said.

Healy could not itemize those benefits but did say that some staff has become more productive, and accounts receivable from tax collections has grown somewhat above the population growth.

Despite public scrutiny, Arthur Andersen plans to remain in the business of automating state systems. Last year, the company had more than 100 state and local contracts in 20 states, according to Andersen's Director of State and Local Government Industry, Dean Nichols. He estimated that the sector of the company's business accounts was approximately 10% of its revenue.

Overruns abound

The tax accounting system is not the only automation system developed for the California Employment Development Department. The other efforts were, on average, 66% over budget and 18 months behind schedule.

Of six automated systems — including disability benefits payments (two phases), job referrals and job referrals order sharing, tax accounting and unemployment insurance — tax automation is the most lucrative for the state, as it brings in most of the state's income.

But included in a total automation package that reached $82.4 million are the other services. Peat Marwick Main & Co. consulted on a job service automation project whose total cost increased 18% from the original estimate. Peat Marwick's contract cost increased from $1.4 million to $5.3 million. For the other projects, Arthur Andersen's bill was $4.9 million more than originally planned.

J. A. SAVAGE

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CASE TOOLS

Sorting out the tangle of tool types

BY VAUGHAN MERLYN and GREG BOONE

With a hundred or so computer-aided software engineering products currently available and more coming onto the market every day, the first steps into CASE can be bewildering. There are tools for highly specific tasks, tools for generalized tasks, tools integrated with one another and tools for tools. There is even an IEEE group currently working on an exhaustive taxonomy of CASE tools.

Definitions are changeable, however, and they are especially undependable during periods of rapid growth. This is particularly true of CASE, which is not just a technology or class of products but a problem-solving approach, a set of methods and disciplines, maybe even a philosophy that will someday guide software development toward a real engineering discipline.

Besides, for users of CASE, whether they are data processing professionals or end users, the questions that really need to be answered are, "What does the tool do?" and "Where does it fit in with other tools?"

KAREN BARBOUR

Drawing the line

Luckily, simply classifying the CASE tools that do exist is a much more realistic task than trying to define all the aspects of CASE. But even that is not easy to do.

Right now, few CASE products fall neatly into well-bounded categories, and most of the packages available are expanding in scope and capability.

Additionally, the systems development function is multifaceted, so the selection of CASE products cannot be adequately addressed by examining any one dimension, such as life cycle phase or product function.

There are some lines of demarcation beginning to emerge, however. New CASE categories will begin to appear on the market as the subject is explored in greater depth.

One way of thinking about CASE tools in order to answer questions about their purpose is a model developed and used at Case Research Corp. The model separates CASE into five major components: repository, reengineering, life cycle support, project support and continuous quality improvement (CQI).

Repository. CASE pivots about the axis of a central repository. The repository is the heart of CASE, the vital, integrating element of the environment. It is much more than a data dictionary, because it touches on all life cycle phases, as well as project support and systems enhancement or reengineering activities.

The repository contains all object definitions and relationships. These objects range from system specifications in the form of data flow and entity relationship diagrams, structure charts and database schemas to screen definitions, report definitions, dialogue/menu definitions and so forth. The repository also contains the keys needed to efficiently identify, locate and extract program code for reuse purposes.

Currently, repository products are largely a subcomponent of broader integrated CASE environments, such as Andersen Consulting's Foundation, Texas Instruments, Inc.'s Information Engineering Facility and Knowledgeware Inc.'s Gamma and Information Engineering Workbench (IEW).

That more repository products are not on the market is probably due, in large part, to the fact that some vendors have been waiting to see what IBM will do.

Reengineering. Until recently, code has been the only tangible asset of software systems. Parts of the design may have been quite valuable, but without a machine-storable, higher level specification to make it accessible, the value of the design was diminished. CASE provides the higher level specification, which makes code more easily replaced.

One of the chief problems in enhancing systems is the difficulty in understanding their logical and physical design. This is where most of the effort involved in maintenance is expended. Fiddling with even one seemingly isolated aspect of a system without examining all the potential effects of a change has caused trouble for more than one programmer.

The increased complexity of application systems demands tools that can provide automated support for the forecasting of those effects as well as make changes at the specification level rather than the code level.

This is done by mapping or reverse-engineering back from the implementation level of program code and databases to a higher level specification (physical design, for example), so that enhancements can be performed at the higher level of abstraction through forward engineering. The combination of reverse engineering and forward engineering is known as reengineering. Enhancement involves all parts

Merlyn and Boone are principals of Case Research Corp., an industry analysis, education and consulting firm in Bellevue, Wash.

INSIDE

Doing it Right Preparation and attitude help make CASE work. Page 68.

A Step Beyond Real-time development demands more than tools can give. Page 70.

Value Index What kind of payback is needed to justify CASE? Page 74.

Tangle

FROM PREVIOUS PAGE

of the system development life cycle and is not simply a separate, sequential phase.

As CASE products are used to construct new systems, the asset value will lie less with the code and more with the design.

Examples of products today that fall within the reengineering domain include data reengineering CASE tools such as Bachman Information Systems, Inc.'s Bachman/DA, code restructurers such as Peat Marwick Advanced Technology's Structured Retrofit and code analyzers such as Viasoft, Inc.'s Via/Insight.

Life cycle support. Our model separates the CASE life cycle into five phases: strategic planning, analysis, logical design, physical design and construction. Instead of visualizing these phases in the usual linear format, we find it more appropriate and correct to think of them as parts of a circle in which each activity connects to the next. This set of activities is monitored, supported and controlled by the project support function.

Within the life cycle, there are phases that are referred to as front end and back end. Front-end products tend to concentrate on the strategic planning, analysis and logical design phases, while back-end products emphasize physical design and construction. There are, in addition, single products, integrated product sets or frameworks that support the entire life cycle, which are called full life cycle products. Full life cycle products that also incorporate project support and reengineering functions are known as "integrated" CASE tools.

Any evaluation of CASE tools must strike a balance between product scope and depth. Even though the advantages of an integrated CASE product may appear dramatic, they can sometimes be offset by deficiencies in the weakest link of the integrated product set. The question then becomes, How easy or difficult would it be to replace that function within the integrated CASE product with another product of one's own choosing?

For example, if you have a large backlog of applications that have been analyzed and logically designed and are ready for development, a back-end CASE generator might be the appropriate choice. By contrast, if you are uncomfortable with the application mix in the backlog and their priorities, you might be more concerned about rethinking the new development portfolio. In that case, you will need to focus on strategic planning, analysis and logical design, so front-end CASE tools might be a better place to start.

FRONT-END products tend to concentrate on the strategic planning, analysis and logical design phases, while back-end products emphasize physical design and construction.

A closer look at each of the life cycle phases and their significance might help you determine the CASE product that is right for your situation.

• Strategic planning. The objectives of this phase include analyzing business information and systems requirements at a high level and prioritizing systems development activities.

In order to address strategic planning, CASE tools need to support conceptual information and process modeling. Typically, this is done through the use of some form of entity-relationship and data flow diagraming techniques. Additionally, strategic planning tools may offer capabilities for matrix analyses, including cluster and affinity analyses. These are used to determine natural boundaries of data for subject area databases as well as groupings of functions or processes so that system boundaries can be ascertained.

While stand-alone planning products do exist, much of the information gathered in a strategic planning survey will be used to drive later life cycle phases. For that reason, there can be advantages to CASE products that support strategic planning and also address later life cycle phases.

• Analysis. The analysis phase is used to identify specific application system objectives and collect information pertinent to the proposed system. While analysis may overlap strategic planning to some degree, analysis tends to have a narrower focus and is performed at a more detailed level.

Structured analysis emphasizes the graphics techniques associated with process and data modeling, system partitioning and collection of data dictionary information. Analysis also frequently involves the collection and creation of text, including interview notes, problem lists, proposals and specifications. In addition, the analyst may also be involved in supporting activities, such as cost-benefit analysis and project planning.

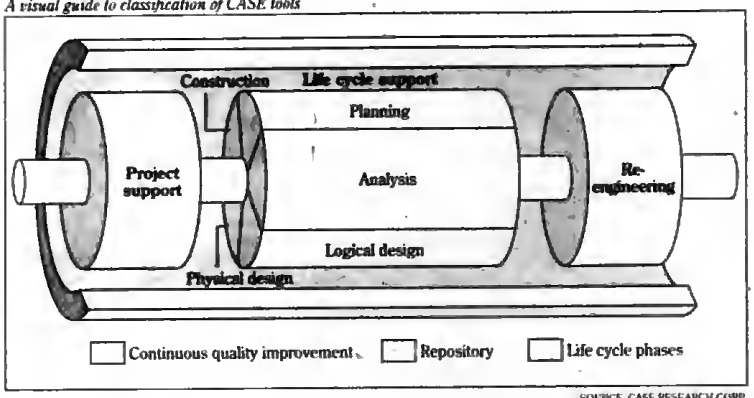
To properly address analysis, CASE tools must support detailed information and process modeling as well as decomposition.

Analysis tools should also support or interface with tools that support text and document processing, presentation graphics, project planning and financial analysis. Although many CASE products are weak in this area, some, such as Softlab, Inc.'s Maestro, are specially designed to support this kind of "analyst's workbench" approach.

Another dividing line in this category of CASE tools is found between process-oriented tools and data-driven products. This distinction refers to an emphasis on business functions, as opposed to the data-driven approach, which concentrates on information. Nastec's Designaid is an example of the process-driven approach, which tends to

Dissecting the category

A visual guide to classification of CASE tools



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How real are the benefits?

The Barton Group, Inc., a CASE consulting company located in Andover, Mass., is conducting a research project to identify the factors that lead to the successful use of CASE. The Survey of CASE Users, sent to 3,000 active users of front-end CASE tools in the U.S., is being analyzed with P. J. Guinan, an assistant professor of MIS at Boston University's School of Management.

Some preliminary findings regarding how CASE can benefit organizations follow. Factors that influence the success of a CASE implementation culled from survey responses as well as the Barton Group's consulting experience are presented in a box on pages 68 and 69.

Quality of documentation. Users report that exceptionally strong and widespread gains are made in documentation because CASE tools provide an easy means for developing and revising such material. The tools support methods that incorporate a number of graphical models, allowing developers and users to "see" the design more quickly and accurately.

Quality of systems design. The results here are mixed. A number of users indicate poor or little improvement. These are usually either new to CASE or have only used the tools to produce documentation, as opposed to building integrated data and process models.

A very large group reports respectable but not extreme improvements, and a small group reports extreme improvements. These last two groups are composed of more experienced users who are beginning to develop and cross-validate interrelated models. They are using the data dictionary capabilities and actively designing systems on the tool rather than documenting designs created elsewhere.

Ability to meet business requirements. Many users report strong improvements here. The tools seem to be forcing the use of methods that produce a better vision and understanding of the systems being designed. Additional iterations catch and correct more errors. The final result is a more complete analysis that closely matches user needs.

Communication and team building. Responses indicate a widespread, midlevel improvement in communication, as the tools force standardized outputs and documentation sets. CASE tools provide a new medium for communicating but do not change the nature of communication. Dramatic results may come later when groupware permits the exchange and revision of specification components among co-workers.

Project team's productivity. Most projects experience moderate improvements. High improvement is achieved when you have a lot of experience. Among those reporting improvement are those who are still on the "CASE honeymoon." These people have used CASE for less than three months, and their companies are first-time CASE/methods users. To them, the tool and method capabilities are incredible.

When faced with complex production use, the honeymoon will be replaced by implementation issues. More substantive improvements are reported by firms that have used CASE for three-plus years, completed at least four projects and used structured methods before CASE. The lesson is that CASE does not provide a major gain very quickly. Time is needed to allow the organization to learn the technology and adapt to it.

Project schedules. Most people experience minor improvement here. The learning curve is greater than expected, but this is usually offset by improved documentation and communication.

be favored by programmers and systems analysts. Chen & Associates' E-R Designer, on the other hand, is an example of a CASE product with the strong data orientation that is favored by data administrators.

While many CASE tools do support both the data and process approaches, a CASE product that appeals to the data administrator, or database designer, might not satisfy the systems analyst, or programmer, and vice versa. So, it is important in formulating selection criteria to determine the primary audience for the CASE product and the methodology preferred by your development groups.

• Logical design. The logical design phase identifies the design of the proposed system at a high level. Logical design focuses on "what" the system must do rather than "how" it should be done. It therefore produces an implementation-independent description of the proposed system.

The separation between analysis and logical design is not absolute, however, so CASE tools for logical design should support both information and process modeling as well as decomposition, although in greater detail than that typically required during analysis. Data modeling and data flow diagraming support is usually provided for these activities.

Additionally, CASE tools for design must facilitate system and program structuring, as well as some way of specifying detailed program logic. Typically, program structure is stated by some form of structure chart diagraming, and program logic is supported by action diagrams such as Warnier-Orr diagrams, pseudocode or decision tables.

As with analysis products, some design products, such as Cadre Technologies, Inc.'s Teamwork or Optima's Designvision, are strongly oriented to logical process design, while others, such as Appleton Co.'s Janus, are oriented toward logical data design.

• Physical design. The physical design phase is used to identify the design of the proposed system at a detailed level.

Physical design begins with the "what" specified during logical design and then refines it to "how" it should be done. It is therefore an implementation-dependent description of the proposed system.

In some CASE tools for physical design, the data models automatically generate database schema, and process models automatically generate some or all of the program code. Screen and report layouts are designed through screen/report "painting," which may extend into a prototyping capability.

Some CASE tools carry prototyping to the further level of simulation, whereby the models are actually executed to simulate the performance and characteristics of the designed system.

Given the close link between logical and physical design, CASE tools for physical design should not only support highly detailed modeling but also decomposition and those elements previously discussed. But that is not the only important overlap to consider.

Physical design is intimately related to construction. Because this is the case, the choice of construction tools may dictate the choice of physical design tools. The more physical design can automatically drive construction, the more productive both will be.

Cortex Corp.'s Corvision is an example of a CASE tool that drives construction from physical design. Similarly, many of the "interfaces" available today between front-end CASE and back-end CASE tools work by passing physical design information from the front-end CASE tool to the back-end CASE tool. As such, the availability of such interfaces will often be a factor in the CASE tool selection process.

Actually, however, availability is not the whole story. Many leading front-end CASE tools have available interfaces to the leading back-end CASE products, but not all of those interfaces are equally effective. This factor should be carefully evaluated before purchase.

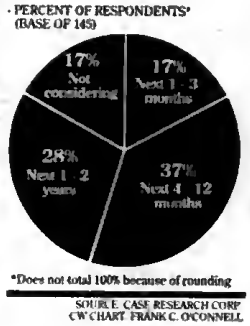
• Construction. The construction phase produces a tested, functioning system from the physical design.

The term "construction" is used deliberately in preference to words such as programming or coding, because some CASE tools automatically generate code

Continued on facing page

Delayed reaction

The majority of prospective CASE users surveyed do not intend to acquire a CASE tool for at least four months; 28% may wait as long as two years



SOURCE: CASE RESEARCH CORP
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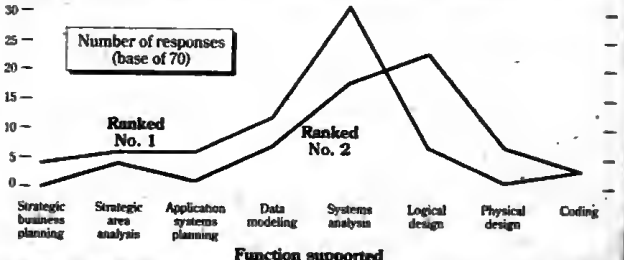
Support function

Systems analysis dominated when users were asked to rank the importance of systems development activities supported by CASE; it topped the list of No. 1 priorities and scored high among No. 2 priorities



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The name game

With the evolution and availability of a wider variety of CASE tools, terms such as "upper CASE" (front-end analysis and design) and "lower CASE" (back-end code generators) came into vogue. Although the puns in these terms made them seem fanciful, the distinction they drew between programming-related technologies and tools for analysis and design was an important one.

Now, however, new terms are coming into fashion. With the growing emphasis on the engineering aspect of CASE, the field of tools has broadened to include virtually anything that increases the rigor, discipline and integration of automation associated with software development. In this more down-to-business climate, the terms "front end" and "back end" are used more by CASE users — partly to avoid the pun, partly to avoid any sense of superiority or inferiority of function.

Products that cover all major life cycle phases are usually called "integrated" or "full life cycle," although vendor marketing sometimes takes poetic license in the use of these terms.

Within the life cycle, there are phases that constitute front-end CASE — popularly the strategic planning analysis and logical design phases — and back-end CASE — physical design and construction. In addition, single products, integrated product sets or frameworks that support the entire life cycle are called full life cycle products. Full life cycle products that also incorporate project support and reengineering functions are known as "integrated" CASE tools.

Other aspects of the development process are going through changes in nomenclature. For instance, maintenance is conventionally thought of as both the correction of defects and as the continual enhancement of existing software to fit new purposes. This term is bad for two reasons. First of all, it has developed a negative connotation, as in "cleaning up a mess." Second, it is used to describe two very different functions. The term "maintenance" should be replaced with the term "system enhancement" or "reengineering." Defect removal and correction should be called exactly what it is — defect removal and correction — and not used synonymously with system enhancement.

VAUGHAN MERLYN and GREG BOONE

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Tangle

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and/or databases from design specifications.

In this case, programming in the conventional manual sense would not adequately describe this activity. Other CASE tools simply offer an editing environment for programming and database specification. These could be described as mechanizing, rather than automating, construction.

In several CASE products, screen layouts produced during physical design will generate screen maps with all required control information, and report layouts will generate complete report programs.

While module and system testing and program debugging are important aspects of construction, the majority of CASE tools do not currently offer significant support for these activities.

Today, most construction tools associated with the CASE field are based on a third-generation language. These products either generate third-generation language code (typically Cobol) in whole or in part, such as Sage Software, Inc.'s APS, or provide editing environments for third-generation language code.

While fourth-generation languages such as Information Builders, Inc.'s Focus and Computer Associates International, Inc.'s Ideal typically predate the CASE movement, they are only now beginning to be incorporated into CASE environments.

For example, Software AG of North America, Inc. has integrated the Deft Apple Computer, Inc. Macintosh-based front-end CASE tool with its Natural 4GL, and Computer Associates has recently announced its Depictor front-end CASE tool to drive the Ideal 4GL.

Perhaps significantly, Knowledgeware has recently announced support for IBM's

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How to with

Success is not an automatic outcome of CASE. Through an extensive survey of CASE users being conducted by his consulting organization (see box page 66), as well as accumulated consulting experience, Richard Barton and others at Barton Group, Inc. have assembled a list of suggestions about what organizations should do to derive maximum benefit from CASE products:

- **Establish a means of measuring results that addresses both short- and long-term costs and benefits.** Quantitative measures answer cost and schedule questions but take a long time to develop a base for comparison. The short-term goals should focus on qualitative improvements and job satisfaction.
- **Keep expectations realistic.** Look for short-term improvements in communication and the quality of deliverables, but do not expect major productivity improvements until you have been using the products for at least three years.
- **Move slowly and carefully.** All organizations resist even simple changes. CASE involves complex changes in organizations and tools. Therefore, a slow, incremental process is required.
- **Scout the territory.** Chances of success are improved by prior use of structured methods. Companies that understand the methods first will find implementing CASE easier.
- **Test extensively.** Organizations that are successful generally conduct at least four pilot projects over more than a year. Pilots should be conducted using portions of the tools and methods on any given project.
- **Forgive test errors.** Expect to make mistakes on pilot projects. They are a learning experience.

Cross Systems Product (CSP) fourth-generation language, as well as offering code generation capability on the PC platform with a new product, IEW/Construction Workstation.

Making a choice between third- and fourth-generation-based construction tools can be a complex process in its own right, and the choice usually comes down to psychological and political issues rather than technical merits.

For years consultants have predicted the imminent death of Cobol, yet Cobol continues to be the dominant language of choice in mainframe-based data processing environments. CASE has so far had little impact on this status quo.

Project Support. While most of the CASE technology features already discussed concern the activities of individual analysts and programmers, most systems development involves teams and work groups. As such, providing a shared project environment and associated support tools is a critical CASE function for all but the most trivial development applications.

Also central to project support functions is the repository. The project database incorporates all of the objects associated with the development project and manages the relationships among those objects.

Project support capabilities may include documentation facilities; facilities for team communication, such as messaging, calendaring and electronic mail; and personal tools, such as outliners, personal schedulers and spreadsheet capabilities.

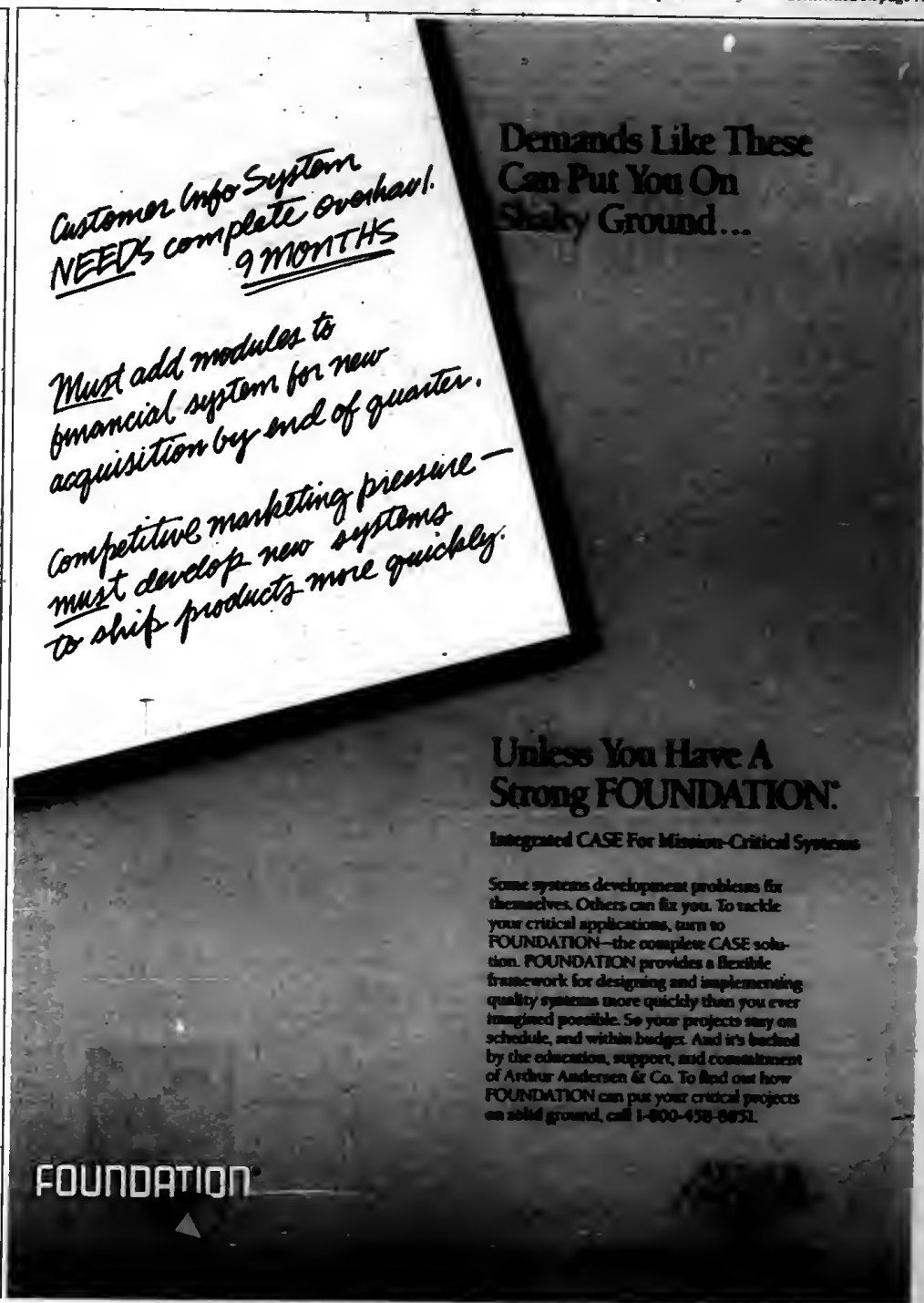
Additionally, a major factor in the success of systems development projects is the effectiveness with which the project is planned, managed and controlled.

Some CASE tools are now offering features such as resource estimating and reporting, security control and audit trails to

Continued on page 70

succeed CASE

- **Allow for postpurchase expenses.** CASE cannot be successfully implemented with a onetime expenditure of capital on hardware and software. These expenses generally account for one quarter to one third of the final cost.
- **Splurge on training.** The requirement for training is usually understated. Expect that 10 days of training will be required to gain proficiency in any given area. Anywhere from two to several months of experience are required to gain complete competence.
- **Supply coaching.** These new tools are so different that project teams require expert assistance. Coaches can identify and correct problems before they become too large.
- **Focus on use and support.** Allow only those projects that can be supported with training and coaching to use the tools. Inadequately supported use leads to confusion and frustration.
- **Encourage full use.** The analytical capabilities of CASE tools are severely underutilized. Develop a team to investigate these capabilities, learn how to apply them and demonstrate their use.
- **Address organisational issues.** Plan for and manage the changes that accompany the use of CASE products, including new skill requirements and the push for a consistent development approach that forces many people to change their work habits. This is perhaps the most important issue.
- **Make improvement a strategic goal.** Improving the development process must be a part of the corporation's strategic plan. Without directed support for the use of CASE, project management has an easy excuse not to follow through.
- **Involve the project manager.** Ensure that these people understand the impact on their role and how to manage CASE-based development.



CASE tools still not ready to meet the real-time challenge

BY DEREK HATLEY

The potential market for real-time CASE tools covers the whole range of high-technology systems development, from military systems to automobile electronics and beyond. These markets are huge, but the challenges to providing them with effective CASE tools are even greater, as the current minimal market penetration shows.

What makes real-time CASE tools different is that every aspect of the development environment for real-time systems is different — from the type of organization involved and the type of system being developed to the development process and the methods used to support it.

Both the firms developing real-time systems and their customers, notably the U.S. government, are often very large. They also produce high-tech products that must conform with strict government and industry standards. This leads to a need for multiuser CASE tools working off large project databases and meeting demanding regulatory requirements.

One special challenge is that real-time systems typically have critical, high-speed timing requirements that cannot be violated without serious consequences. They also tend to have complex control and processing requirements and to be embedded in larger systems, such as aircraft or manufacturing process control systems. These properties significantly affect the development process and development methods, both of which have a major impact on CASE tool requirements.

The development process for real-time systems is strongly influenced by the size of the development organization, by the complexity, criticality and multidisciplinary nature of the development and by the strict design and documentation standards imposed by the customers.

Real-time systems are often developed along with the systems with which they must interact, so several layers of systems, hardware and software all must be developed in unison.

Another factor that must be taken into account is that the scope of real-time systems development is much broader than

Continued on page 72

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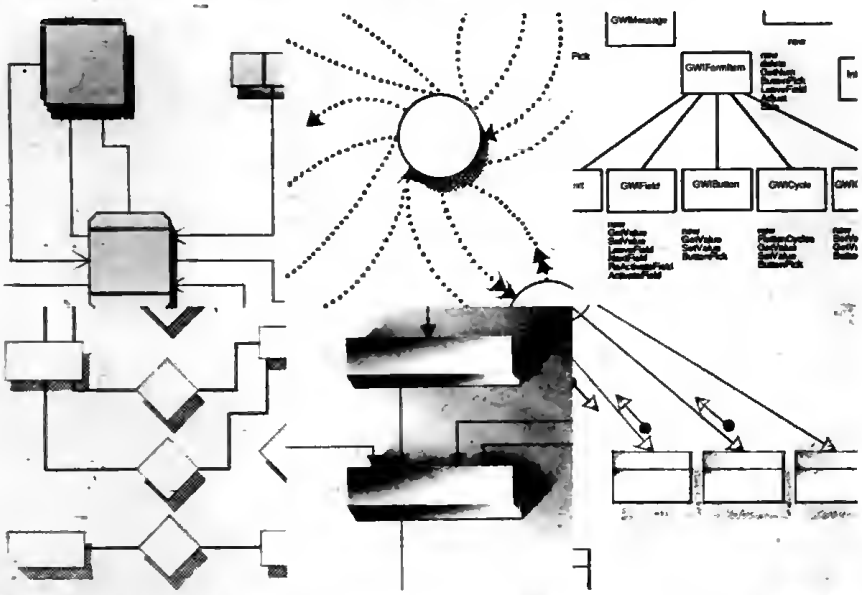

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Tangle

CONTINUED FROM PAGE 69

address this area.

Continuous quality improvement. One of the real secrets of CASE lies in the discovery that CASE technology is much more about quality than about productivity, although by doing it right the first time, productivity will inevitably increase.

Users who bring a rigorous, systematic, disciplined approach to software development can significantly reduce defects much earlier in the life cycle and result in a more reliable and correct application.

Using CASE for quality assurance requires changing perspective — from focusing exclusively on what software is being developed to also looking at how software is being developed. It represents a shift in focus from product to process.

When this approach of continually examining the process by which software is developed to eliminate snags and error-causing limitations is combined with this way of thinking about defect removal, the result is another dimension of CASE,

USING CASE FOR quality assurance requires changing perspective — from focusing exclusively on what software is being developed to also looking at how software is being developed.

known as continuous quality improvement.

The new approach to defect removal takes that process out of the separate maintenance life cycle phase and makes it an activity common to all life cycle phases, including the planning, analysis and design stages.

It is the CQI component that guides the design of instrumentation and metrics as well as the collection, data capture and analysis of those metrics. To really be able to collect the data needed to evaluate the software development process, it should be collected at the source in an automated, organized format.

Unfortunately, the inability to accomplish this task is currently one of the largest shortcomings of CASE products today, and it represents an opportunity that vendors have not quite begun to recognize. •

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Real-time

CONTINUED FROM PAGE 70

that of non-real-time development. Real-time systems are developed as complete custom systems with newly developed or adapted hardware, software and interfaces. This means that it is not sufficient to address software development alone — a point that many users and CASE tool developers miss. It also means that CASE tools must be able to handle interactions and traceability between multiple systems and multiple layers of specification.

Because of the complex and critical nature of real-time systems and their development process, new formal development methods have been devised both for requirements and design specification. The two most commonly used for requirements specification, both of which combine structured analysis with finite state machine theory, are the Hatley/Pirbhai and Ward/Mellor methods.

For design specification, a number of methods have appeared, none of which has yet been widely accepted. These include Design Aid for Real-Time Systems (DARTS), a combination of structured analysis and structured design with some real-time constructs added; a number of variations on object-oriented design, favored by proponents of the Ada language; a number of Petri net approaches, representing systems with a control flow model; Statecharts, a variation of finite-state machine theory, with layered systems; and Architecture Modeling, a part of the Hatley/Pirbhai method. There are other methods involved in real-time system development that are candidates for automation with CASE, including methods for hardware development, configuration management, documentation, system and software testing and so on.

DESPITE ALL the current deficiencies, a CASE tool that fits into your development process and that aids some specific part or parts of that process can be a useful asset.

With the scope and complexity of all these factors that make up the real-time system development environment, finding a CASE tool capable of supporting the environment can be a discouraging task.

At Smiths Industries, we have been watching the evolution of CASE tools and evaluating them, especially those for real-time applications, since their inception around 1984. We have yet to find anything that answers all our requirements.

What we have found is that CASE tools are still very much in their infancy. At last count there were a dozen or so tools that claimed to support the Hatley/Pirbhai real-time requirements specification method. Based on our evaluations, so far not a single tool actually provides this support completely and correctly. For design specification, the only widely supported method is conventional structured design, which is not adequate for real-time systems. Some tools support one or another of the design methods mentioned earlier, but there is no consensus on the best approach.

Smiths Industries recently did a comparative evaluation of the three tools that seemed to come closest to our needs. The scoring system we used was based on support of these methods and general functionality, and all three tools scored between 40% and 50% of the possible total. With those scores, the product would be only marginally useful to us. As a result, we have again deferred making a firm commitment to any tool.

Despite all the current deficiencies, a CASE tool that fits into your development process and that aids some specific part or parts of that process can be a useful asset. It could be just as worthwhile to acquire a CASE tool for the exposure you will get and its future potential as for its immediate benefits. Smiths Industries currently has small installations of two tools for this purpose and is considering installing a third. They are used for limited application on certain projects and have been beneficial at least for information recording, consistency checking and documentation purposes as well as for giving us a better idea of what we would like from a real-time CASE tool in the future.

Given the demands of real-time systems development and the limited capabilities of current CASE tools, the most important features you should look for include an open architecture and flexibility. These capabilities will give you a chance to get at what you want and adapt it to what you need. Since real-time development tends to be unique from one environment to another, it is not even out of the question to consider developing your own in-house tool (based on a graphic front-end and a database system from the excellent selections that are now available) if your organization is large enough to justify it.

CASE will eventually become a major part of our real-time systems development tool kit — it just isn't ready yet. •

Hatley, an engineering consultant, is principal staff engineer at Smiths Industries in Grand Rapids, Mich., and co-author of *Strategies for Real-Time System Specification*, published by Dorset House in New York.

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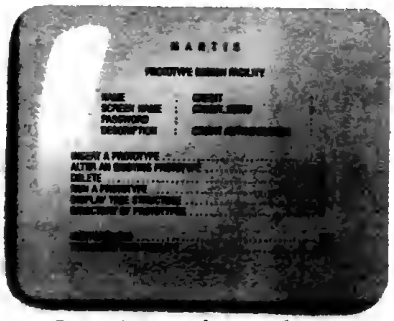

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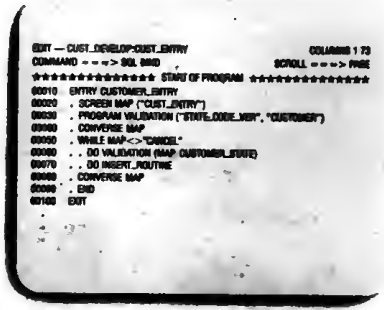

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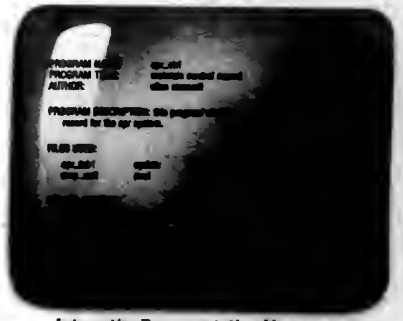

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The fine art of figuring CASE payback

BY CATHLEEN SANTOSUS

With average prices for CASE tools ranging between $6,000 and $50,000, companies are discovering that selecting such tools is as much a business decision as a technical one.

"As soon as you determine that the basic functionality you require exists in these products, then the technology essentially becomes irrelevant," says Sue Ann Hawley, a West Bloomfield, Mich.-based consultant who advises both CASE vendors and CASE users.

After that point, Hawley says, the real focus for most organizations is figuring out what kind of payback is needed to justify the purchase of multiple copies of these pricey tools.

The trouble is that in order to calculate payback on CASE, you have to bend some of the basic rules of business math and factor in additional soft costs such as learning time and cultural adjustment as well as less tangible benefits.

Joseph Izzo, president of Information Technology Group, a division of A. T. Kearney, Inc. in Santa Monica, Calif., has a formula that he uses, but it includes some unknowns. Expressed succinctly, Izzo believes that a company breaks even on its CASE investment if it can achieve a 4-to-1 productivity gain in two to five years.

Costly start-up

The catch is that productivity must be evaluated against the entire development cycle, because the large start-up costs will not level off for the first two years.

Furthermore, since 70% to 80% of applications efforts involve software maintenance, it will also be a few years before a concrete and conclusive picture of CASE productivity benefits can emerge.

Information Technology Group's Izzo

The key to making the formula work for you, Izzo says, is to fully understand your ultimate goal in acquiring CASE before you even begin evaluating tools. If you do not clearly understand how you are going to achieve a four-fold productivity gain using CASE, he notes, you will not get anywhere.

Jerry Grochow, vice-president of American Management Systems' corporate technology group in Arlington, Va., dispenses similar advice.

Before an organization can attempt to cost-justify CASE, Grochow says, it must understand the current level of productivity or quality of its software development systems.

Once this baseline is established, an organization can set up

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Santosus is executive director of the Magnetic Press Editorial Network in New York.

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John Voss, Vice President, Systems and Programming

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an ongoing measurement program spanning the entire MIS department that will allow comparison of CASE pilot projects with ongoing conventional systems development projects.

At first, the results will probably not seem very impressive, at least from a productivity improvement standpoint. Most experts agree that productivity will go down before it goes up with CASE, taking into account learning curves and the cultural change implied in automation of software development for information systems departments.

There are, however, some counterbalancing benefits that are often left out of the equation.

One factor is the improved quality of the software product, resulting in reduced maintenance costs. Unlike productivity, Hawley says, "Quality is impacted the day you start using the product — the first time it finds an error."

AMS' Grochow

Another benefit, Grochow says, is the leverage that CASE provides against the cost of training and compensating highly trained systems development personnel.

The cost-justification process can also be a lot easier, Hawley suggests, if a company does not try to start out with the tool of its dreams. There are, she points out, a handful of CASE products on the market right now that are priced below $2,000, and these tools can serve as a starting point for an organization that is not sure of what it wants.

Temporary measure

Harold Kleven, manager of data administration at Super Value Stores in Minneapolis, decided to try that route after looking at CASE seriously and concluding that most products still had a long way to go.

Afraid that choosing the wrong direction in CASE could be a very costly mistake, Kleven chose Computer Systems Advisers, Inc.'s Picture Oriented Software Engineering (POSE), a front-end tool, because he felt it offered the most capability for the least money — he paid $295 per module for the product.

MOST EXPERTS AGREE productivity will go down before it goes up, taking into account learning curves and the cultural change implied in automation of software development for IS departments.

"It's a very competitive in terms of its functions, and the cost is certainly attractive," he says. "POSE does what we're looking for at the lowest price possible. If CSA turns out not to be competitive, we can go somewhere else and not feel we've lost a fortune."

Although Kleven is secure in his choice, not everyone believes that price shopping for CASE tools is a good idea.

Izzo, for example, says he doubts that the lower priced products are suitable for any large IS shop. "I don't believe the $1,000 or $2,000 products are ever going to get you to 4-to-1 productivity [gains]," he says. "You're going to have to bite the bullet, and it's going to be expensive."

When a company first evaluates a CASE tool, it needs to discover how it fits into the overall organization, how long it will take to learn and how much time it will save.

When an organization actually decides to purchase the tool, Grochow says it must then consider the product's impact on the entire organization, taking into account such factors as the tool's total maximum productivity benefit.

Whatever CASE tool a company buys today, it is likely to want to buy a completely different product within three years, Izzo says. "But those first three years represent a step in the right direction," he says.

During that period, organizations will develop and anticipate the fundamental changes that can result from successful CASE implementation. •

ASK THE VENDOR

Will the next release of Cadware's Foundry product offer support for IBM's new repository?

Vince Petrell
Systems Analyst
Westinghouse Electric Corp.
Columbia, Md.

CADWARE, INC.: IBM's new repository is not completely defined, and detailed information for the support of the repository is not yet available.

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Diagram a relational database and our tools can generate SQL DDL and DML statements *automatically*. This means that people using KnowledgeWare tools don't have to be experts in DB2. Plus, they can develop complex systems with more than one DBMS strategy. Like systems that use both VSAM and DB2, in either on-line or batch modes. And once you have a logical data model, our tools will *automatically* transform it into a physical database.

Real tools with re-engineering capabilities you can use today

Our load utility lets you capture and reuse or modify existing IMS database definitions and COBOL data structures. Our tools can generate diagrams based on your existing IMS data definitions *automatically*. You can also load COBOL record descriptions and *automatically* create the associated data structure diagrams.

Real tools with a common Encyclopedia to ensure consistency

Since all of our tools share a common Encyclopedia, information is consistent throughout the entire development process: Any changes made with one tool are *automatically* reflected in the diagrams and definitions of the other tools. As a result, developers can focus on design instead of focusing on hunting down inconsistencies.

Real tools with the flexibility to fit your way of working

With KnowledgeWare tools, you're free to build applications almost any way you like. Ideally, you might start with the planning tool, move to the analysis and design tools, and then produce a working application with IEW/GAMMA.

But if that's not the way you work, you can start application development with any KnowledgeWare tool. For example, you can do some design and then go back and work on analysis. Plus, you can choose from a number of the most commonly used methodologies and techniques. In short, you can put our tools to work without giving up methods that already work for you.

Call 1-800-338-4130

For more information on our Planning, Analysis, and Design Workstations, or any of our mainframe CASE tools, call our toll-free number (in Georgia, call 404/231-8575). KnowledgeWare, Inc., 3340 Peachtree Rd. N.E., Suite 1100, Atlanta, Georgia 30026.

KnowledgeWare®

The World's Most Comprehensive CASE Tool Set™

CASE software products

COMPANY	PRODUCT	PRODUCT TYPE	PART OF A MORE EXTENSIVE CASE SYSTEM	LINKS WITH WHICH THIRD-PARTY CASE PACKAGES	HARDWARE PLATFORM	WORKS WITH WHAT PROGRAMMING LANGUAGES	GENERATES SQL SCHEMAS AND QUERIES	AUTOMATIC ON-LINE OR BATCH CODE GENERATION	GENERATES A PRODUCTION PROGRAM	GENERATES DOCUMENTATION	PROVIDES MULTIUSER SUPPORT	BUILT-IN PROJECT MANAGEMENT FUNCTIONS	INTERNAL AI FUNCTIONS	PROVIDES WINDOWING CAPABILITIES	INCLUDES WHAT INTERNAL TESTING AIDS	SUPPORTS REAL-TIME DEVELOPMENT	PRICE
Adasc Corp. (415) 974-6699	FM/SS	Re-engineering, data administration, maintenance tool	No	Data dictionaries used by most CASE tools	IBM MVS mainframes	Cobol, PL/I, assembly	NP	No	No	Yes	NP	No	None	No	Lists program changes and datasets, records, screens and reports affected	Yes	$75,000
Advanced Microsolutions (415) 365-9480	Automatic Test Supervisor (ATS)	Application generator	Yes	No	HP 9000 Series 200, 300, IBM AT and compatibles	RMB	NP	On-line	Yes	Yes	Yes	No	Table driven	No	None	Yes	$3,495
Advanced Technology International, Inc. (212) 354-6280	SuperCASE/SCI	Re-engineering tool	Yes	No	DEC VAX/VMS	Fortran	No	Both	No	Yes	Yes	Yes	None	Yes	None	Yes	$7,000 to $15,000
American Management Systems, Inc. (703) 841-6060	Life-Cycle Productivity System	Code generator testing aid	Yes	Excelerator	IBM 3090, AS/400	Cobol	No	Both	No	Yes	Yes	Yes	None	No	Yest data generation, monitoring, control	Yes	$250,000 to $310,000
Analysts International Corp. (212) 466-1660	Corvet	Full life cycle product	No	No	IBM 4300, 3080, 3090	Cobol, CICS, IMS, DB2	NP	Both	Yes	Yes	Yes	No	None	No	None	Yes	$75,000 to $150,000
Arkanlis Systems, Inc (501) 227-8471	RPG Generator	Code generator	No	No	IBM System/36	RPG	NP	Batch	Yes	No	No	No	None	No	None	No	$415
Andersen Consulting (800) 458-8881	Foundation	Application generator, integrated CASE	Yes	IBM Data Dictionary, DB2 catalog, IDMS, Cullinet Integrated Data Dictionary	IBM AT, PS/2 and compatibles, 4300, 3030, 3080, 3090	Cobol	Yes	On-line	Yes	Yes	Yes	Yes	None	No	Yest data maintenance, versioning	No	$200,000
Automated Software Concepts, Inc. (919) 782-7752	Turbo Programmer	Application generator	No	No	IBM PC/XT/AT, PS/2 and compatibles	Turbo Pascal, Turbo C, Microsoft C	No	On-line	Yes	Yes	No	No	None	Yes	On-line program testing	No	$299
Bachman Information Systems, Inc. (617) 354-1414	Bachman/ Database Administrator (IDMS)	Re-engineering, database design tool	Yes	No	386-based PCs, AT&T workstation	IDMS	No	On-line	Yes	Yes	No	No	Integrated expert advisor in reverse engineering knowledge base, database design and information modeling	Yes	None	No	$10,000
	Bachman/ Database Administrator (DB2)	Re-engineering, database design tool	Yes	No	386-based PCs, AT&T workstation	DB2	Schemas	On-line	Yes	Yes	No	No	Same as above	Yes	None	No	$10,000
David R. Black & Associates (216) 686-2741	Cobol Program Generator	Full life cycle product	No	No	Prime, DEC VAX, Unisys 1100, IBM PC/XT/AT, PS/2 and compatibles	Cobol	No	Both	Yes	Yes	Yes	Yes	None	Yes	Unit integration testing	Yes	$30 000 to $50,000
Boole & Babbage, Inc. (408) 735-9550	Team-Errzon	Code generator	Yes	Some in development	IBM mainframes running CICS	Cobol	Yes	Both	Yes	Yes	Yes	Yes	None	No	None	No	$300,000
Bytel Corp. (415) 527-1157	Cogen	Code generator	No	No	IBM PC/XT/AY, PS/2 and compatibles	Cobol	No	Both	Yes	Yes	Yes	No	None	No	None	Yes	$450
	Genifer	Code generator	No	No	IBM PC/XT/AT, PS/2 and compatibles	Dbase, Clipper, Foxvase, Quicksilver	No	Both	Yes	Yes	Yes	No	None	No	None	Yes	$395
Cadre Technologies, Inc. (401) 351-3273	Teamwork/ASB	Code generator	Yes	Any via ADIF EDI	DEC, Sun, Apollo workstations, IBM PS/2 and compatibles	Ada	NP	On-line	Yes	No	Yes	Yes	None	Yes	Realtime software performance verification, code coverage measurement	Yes	$2500
Cadre Technologies, Microcase Division (503) 690-1300	Software Analysis Work Station	Optimization, verification tool	Yes	No	IBM AT and compatibles	Any	No	No	No	Yes	No	No	None	Yes	Tests how much of the program in testing has been executed	Yes	$23,000
Cadware, Inc. (800) 223-9273	Sylva Picture Programmer	Code generator	Yes	Most Cobol compilers	IBM PC/XT/AT, PS/2 and compatibles	Cobol	No	Both	Yes	Yes	Yes	No	Rule-based checking	No	None	NP	$4,495
Caseware, Inc (714) 754-0308	Amplify Control	Full life cycle product	Yes	Frame Technology Framemaker, IDE	Sun, Pyramid	Any	No	No	No	No	Yes	No	None	Yes	Testing management	Yes	NP
Caseworks, Inc. (800) 635-1577	CASE-PM The CASE Tool for Presentation Manager	Code generator; re-engineering, testing tool	No	No	IBM PC/XT/AY, PS/2 and compatibles	C	No	Both	Yes	No	No	No	Expert system	Yes	Test Presentation Manager application, graphical user interfaces and Presentation memory management configurations	Yes	$995
	CASE-W the CASE tool for Windows	Code generator; re-engineering, testing tool	No	No	IBM PC/XT/AT, PS/2 and compatibles	C	No	Both	Yes	No	No	No	Expert system	Yes	Tests Windows applications, graphical user interfaces and Windows memory management configurations	Yes	$795

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

COMPANY	PRODUCT	PRODUCT TYPE	PART OF A MORE EXTENSIVE CASE SYSTEM	LINKS WITH WHICH THIRD-PARTY CASE PACKAGES	HARDWARE PLATFORM	WORKS WITH WHAT PROGRAMMING LANGUAGES	GENERATES SQL SCHEMAS AND QUERIES	AUTOMATIC ON-LINE OR BATCH CODE GENERATION	GENERATES A PRODUCTION PROGRAM	GENERATES DOCUMENTATION	PROVIDES MULTIUSER SUPPORT	BUILT-IN PROJECT MANAGEMENT FUNCTIONS	INTERNAL AI FUNCTIONS	PROVIDES WINDOWING CAPABILITIES	INCLUDES WHAT INTERNAL TESTING AIDS	SUPPORTS REAL-TIME DEVELOPMENT	PRICE
CGI Systems, Inc. (800) 722-1866	Fuchsc	Full life cycle product	Yes	Excelerator	IBM 4300 and up; Honeywell DPS 7/8; Unisys 1100, A series	Cobol	Yes	Both	Yes	Yes	Yes	Yes	In development	Yes	None	No	$150,000 to $350,000
Cincom Systems, Inc. (800) 543-3010	Mantis, M/Text, CPCS	Full life cycle product	Yes	Excelerator	IBM 370, PC, XT, AT, PS/2 and compatibles; DEC VAX	Any	Yes	On-line	Yes	Yes	Yes	Yes	None	Yes	Host session switch, screen I/O regression testing	Yes	NP
Clear Software, Inc. (800) 338-1759	Clear+	Re-engineering tool	No	Any code generator	IBM PC, XT, AT, PS/2 and compatibles	C, Dbase	No	No	No	Yes	Yes	Yes	Graphical algorithms	Yes	On-line simulation	Yes	$199.95
The Coding Factory, Inc. (201) 981-0100	Colac	Code generator	No	Any front end	IBM PC/XT/AT, PS/2 and compatibles	Cobol	No	Both	Yes	Yes	Yes	Yes	None	Yes	On-line prototyping	Yes	$1,995
Cognos, Inc. (613) 738-1440	PHLEX	Code generator	Yes	Excelerator	IBM PC and compatibles	Powerhouse 4GL	No	Batch	No	No	No	No	None	No	None	No	$1,750
Cortex Corp. (617) 894-7900	Cortexor	Full life cycle product	Yes	Any VAX/VMS compatible	DEC VAX/VMS	None	In development	Both	Yes	Yes	Yes	Yes	Intelligent guidance system, project management guide, development knowledge base	Yes	Dynamic debugger, trace testing	Yes	From $60,000
Cullinet Software, Inc. (617) 329-7700	Enterprise Generator	Code generator	Yes	No	DEC VAX	Cobol, Fortran, Basic, C	Yes	Both	Yes	Yes	Yes	No	Expert system components	Yes	Yes	Yes	$2,400 to $94,000
Delft, Inc. (416) 249-2246	Delft Gateway	Application generator, re-engineering tool	Yes	No	DEC VAX, Sun/Unix	SQL	Yes	On-line	No	Yes	Yes	No	None	Yes	None	No	$15,000 to $20,000
Digital Equipment Corp. (603) 881-2505	VAX Rally	Application generator	Yes	Excelerator	VAX/VMS	All VAX languages	Yes	Both	Yes	Yes	Yes	Yes	None	Yes	System, integration testing, debugging	No	From $4,200
	VAX Cobol Generator	Application generator	Yes	Excelerator	VAX/VMS	Cobol	Yes	Both	Yes	Yes	Yes	Yes	None	Yes	Same as above	No	From $4,500
	VAX Code Management System	Testing, configuration management tool	Yes	Cadre	VAX/VMS	All VAX languages	No	None	No	Yes	Yes	Yes	None	Yes	Unit, integration testing	Yes	From $1,300
	VAX Module Management System	Testing, configuration management tool	Yes	No	VAX/VMS	All VAX languages	No	None	No	Yes	Yes	Yes	None	Yes	Unit testing	Yes	From $320
	VAX DEC/Test Manager	Testing tool	Yes	No	VAX/VMS	All VAX languages	No	None	No	Yes	Yes	Yes	None	Yes	Automatic regression, windows-based applications testing	Yes	From $1,200
	VAX Performance and Coverage Analyzer	Testing tool	Yes	No	VAX/VMS	All VAX languages	No	None	No	Yes	Yes	Yes	None	Yes	Test coverage, performance analysis	Yes	From $1,050
	VAX Language-Sensitive Editor	Code generator, testing tool	Yes	No	VAX/VMS	All VAX languages	Yes	Both	Yes	Yes	Yes	No	None	Yes	Integrated debugging	Yes	From $750
	VAX Source Code Analyzer	Re-engineering, testing tool	Yes	No	VAX/VMS	All VAX languages	No	None	No	Yes	Yes	Yes	None	Yes	Unit, integration testing	Yes	From $600
	VAX Document	Documentation generator	Yes	Cadre	VAX/VMS	None	No	None	No	Yes	Yes	No	None	Yes	None	Yes	From $1,350
	VAX Software Engineering Tool	Code generator, re-engineering, testing tool	Yes	No	VAX/VMS	All VAX languages	Yes	Both	Yes	Yes	Yes	Yes	None	Yes	Unit, integration, regression testing, performance measurement, test coverage	Yes	From $3,910
	CASE for Information Systems	Full life cycle product	No	Excelerator, Smartstar	VAX/VMS	All VAX languages	Yes	Both	Yes	Yes	Yes	Yes	Yes	Yes	Automatic regression testing, performance measurement, test coverage, metric collection	No	From $17,300
Evansville Data Processing Corp. (812) 479-6051	Gen81	Code generator	No	No	DEC VAX/VMS	Cobol	No	Both	Yes	Yes	Yes	No	None	No	Interactive testing	Yes	$24,000
E-Z Gen, Inc. (800) 420-0211	E-Z COB	Code generator	No	No,	IBM PC/XT/AT and compatibles	Cobol	No	On-line	Yes	Yes	Yes	No	None	No	Prototyping	No	$225
General Data Systems, Inc. (215) 985-1780	GDX	Application generator	No	No	IBM running MVS, PC/XT/AT, PS/2 and compatibles, all Tandem	Proprietary	No	Both	Yes	Yes	Yes	No	Built-in expert systems language	Yes	Internal testing, debugging	Yes	$25,000 to $180,000
Help/Systems, Inc. (612) 933-0600	Genesis V	Application generator	No	No	IBM System/38, AS/400	RPG III	No	On-line	Yes	Yes	Yes	No	Knowledge base to determine what RPG code to produce	No	Specification testing	Yes	$14,950
Hewlett-Packard Co. Contact local sales office	HP 64000 AxCASE	Full life cycle product	Yes	Teamwork	HP 9000 series 300 800	C	No	Both	Yes	Yes	Yes	Yes	None	Yes	Software performance analysis	Yes	$6,870 to $20,000
IBM Contact local sales office	Cross System Product	Application generator	No	Excelerator, Knowledgeware IEW	IBM running MVS/XA, VM/SP, DOS/VSE, DP FX, OS/2, PC-DOS	Cobol	NP	NP	Yes	Yes	Yes	No	None	No	Interactive testing and debugging	Yes	$12,470 to $80,270
Icenia Software Engineering, Inc. (213) 458-0092	Power Tools	Application generator, reverse engineering tool	Yes	No	Macintosh Plus, SE, II, IIX, A/UX	No	No	No	No	Yes	Yes	No	None	Yes	None	Yes	$995
Index Technology Corp. (617) 494-8200	XL/Interface for Micro Focus	Code generator	Yes	Cobol/2 Workbench	IBM PC/XT/AT and compatibles	Cobol	No	On-line	No	No	Yes	No	None	No	None	No	$650
	XL/Interface for Prompter's Talon	Code generator	Yes	Talon	IBM PC/XT/AT and compatibles	Cobol, PL/I	No	On-line	No	No	Yes	No	None	No	None	No	$9,000
	XL/Interface for DB2	Code generator	Yes	No	IBM PC/XT/AT, PS/2 and compatibles	Basic, PL/I, C, Cobol, SQL	Yes	On-line	No	Yes	Yes	No	None	No	None	No	$7,500

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COMPANY	PRODUCT	PRODUCT TYPE	PART OF A MORE EXTENSIVE CASE SYSTEM	LINKS WITH WHICH THIRD-PARTY CASE PACKAGES	HARDWARE PLATFORM	WORKS WITH WHAT PROGRAMMING LANGUAGES	GENERATES SQL SCHEMAS AND QUERIES	AUTOMATIC ON-LINE OR BATCH CODE GENERATION	GENERATES A PRODUCTION PROGRAM	GENERATES DOCUMENTATION	PROVIDES MULTIUSER SUPPORT	BUILT-IN PROJECT MANAGEMENT FUNCTIONS	INTERNAL AI FUNCTIONS	PROVIDES WINDOWING CAPABILITIES	INCLUDES WHAT INTERNAL TESTING AIDS	SUPPORTS REAL-TIME DEVELOPMENT	PRICE
I-Logix, Inc. (617) 272-8090	Statemate	Systems engineering tool	Yes	No	DEC Vaxstation, Sun and Apollo workstations	No	No	Batch	No	Yes	Yes	Yes	None	Yes	Tests consistency between requirements and specifications	Yes	$35,000
Interactive Development Environment (800) 888-4331	Software Through Pictures	Full life cycle product	No	Software backplane. Sun NSE, DEC CMS, Apollo DSEE3	Apollo, Sun workstations, DEC VAX/VMS, Ultrix, HP 9000	Ada C Pascal	Yes	Both	No	Yes	Yes	No	None	Yes	None	Yes	$5,000 to $21,000
Interactive Software Engineering, Inc. (805) 685-1006	Eiffel	Full life cycle product	No	No	Unix, VAX/VMS	Proprietary, C	No	Both	Yes	Yes	Yes	No	None	Yes	Unit testing	No	$2,000 on $8,000
Language Technology, Inc. (508) 741-1307	Reorder	Re-engineering tool	No	No	All IBM mainframes	Cobol IMS	No	Batch	Yes	Yes	Yes	No	None	No	None	No	$74,500 on $149,500
	Reorder/CICS	Re-engineering tool	No	No	All IBM mainframes	Cobol IMS	No	On-line	Yes	Yes	Yes	No	None	No	None	No	$87,000 on $174,000
	Inspector	Re-engineering, testing tool	No	No	All IBM mainframes	Cobol IMS	No	No	No	Yes	Yes	No	None	No	Pinpoints problem areas	No	$14,500 to $29,500
Magec Software (800) 336-2432	Magec	Full life cycle product	No	Excelerator	IBM 370, PC/XT/AT, PS/2 and compatibles	Cobol	No	Both	Yes	Yes	Yes	No	None	Yes	Tests runtime execution, current program version, screens, data definitions, environmental changes	No	$20,000 to $200,000
Magna Software Corp. (212) 991-8300	Magna 8	Application, code generator	No	No	Honeywell Bull 8000, 9000, 88, 90	Cobol	NP	Both	Yes	No	Yes	No	None	No	NP	No	$60,000 to $140,000
Manager Software Products, Inc. (617) 863-5800	Source Manager	Application, code generator	Yes	No	IBM 370, 4300, 3030, 3080, 3090	Cobol	Yes	Both	Yes	Yes	Yes	No	None	Yes	Unit testing	No	$50,000 to $100,000
Mark Jeffery Koch & Associates, Inc. (609) 596-0866	ACT/1	Application generator	No	No	IBM running VSE, VM, MVS/XA, ESA	Cobol, PL/I	No	On-line	Yes	Yes	Yes	No	None	Yes	Scenario mode for prototyping	Yes	$15,000 to $60,000
Maxim Software Technology Corp. (617) 567-0637	Layout	Application, code generator	No	No	IBM PC/XT/AT, PS/2 and compatibles	C, Pascal, Basic	No	On-line	Yes	Yes	No	Yes	Expert system built-in	Yes	Users can view program under construction any time and make edits	Yes	$149.95
Matesehorn, Inc. (800) 634-4265	Ribol	Application generator	No	Realia Cobol, Micro Focus Cobol compiler, Austec RM/Cobol-85, Bell Atlantic MVP compiler	IBM 370, PC/XT/AT, PS/2 and compatibles	Cobol, CICS	No	On-line	Yes	Yes	Yes	No	AI base for generation of applications	No	None	Yes	$1,995 to $30,000
	CICS/PC	Application generator	No	Same as above	IBM PC/XT/AT, PS/2 and compatibles	Cobol, C	No	Both	No	No	Yes	No	None	No	Yes	Yes	$1,495
McDonnell Douglas Information Systems, Co. (800) 325-1087	Pro-IV	Application generator	Yes	Prokit* Workbench	IBM 9300, 3030, 3080, 3090, 4300, PC/XT/AT, PS/2 and compatibles (AS/400 late 89); DEC VAX, AT&T 3B series; HP 90000 series; Honeywell PDS6, Prime EXL, NCR Tower	Cobol, C, assembler	In development	No	Yes	Yes	Yes	No	None	Yes	Prototyping	No	$2,000 on $100,000
Menlo Business Systems, Inc. (415) 948-7920	Foundation	Full life cycle product	No	No	Tandem DETP	Cobol	Yes	Both	Yes	Yes	Yes	No	None	Yes	NP	Yes	$76,500
Mentor Graphics Corp. CASE Division (503) 626-7000	CASE Station	Re-engineering, analysis, design and documentation tool	No	No	Apollo 3000, 4000 workstations	C, Fortran	No	No	No	Yes	No	Yes	None	Yes	None	Yes	NP
	CASE Bench	Re-engineering tool, analysis, design and documentation	Yes	No	DEC VAX/VMS, Microvax, Vaxstation	C, Fortran, any VMS-compatible	No	No	No	Yes	Yes	Yes	None	Yes	None	Yes	NP
Meta Systems Ltd. (313) 663-6027	Meta Systems Toolset	Full life cycle product	No	Most via PSL/PSA (proprietary)	DEC VAX/VMS, IBM VM/CMS, VMS, Gould/Unix	C, Cobol, Ada, Fortran	No	No	No	Yes	Yes	Yes	None	Yes	None	Yes	$120,000 to $160,000
Michaels, Ross & Cole Ltd. (312) 916-0662	MRC-productivity series	Full life cycle product	No	No	IBM AS/400	RPG	Yes	Both	Yes	Yes	Yes	Yes	No	Yes	NA	Yes	$39,500
Micro Focus, Inc. (800) 872-6265	Micro Focus Cobol/2 Workbench	Application, code generator, re-engineering, testing tool	No	Excelerator, Sage ACS, Knowledgeware, Teken, Netrun	IBM PC/XT/AT, PS/2 and compatibles	Cobol	No	Both	Yes	Yes	Yes	No	None	Yes	Unit, integration testing	No	$3,290
Netron, Inc. (416) 636-8333	Netron/CAP Development Center	Full life cycle product	No	Excelerator, IEW, Panvalet	IBM PC and compatibles, MVS/TSO, VM/CMS, DOS/VSE mainframes, DEC VAX/VMS, Wang VS	Cobol	Yes	Both	Yes	Yes	Yes	No	None	Yes	Tests screen design compatibility	No	NP
Online Software International, Inc. (201) 592-0009	Intelagen	Application, code generator	Yes	Canepac	IBM 370, 3030, 3080, 4300	Cobol, PL/I	Both	Yes	Yes	Yes	Yes	No	None	Yes	None	Yes	$80,000
Optima, Inc. (800) 635-8303	Brachate Plus	Code generator, diagrammer	No	No	IBM PC/XT/AT, PS/2 and compatibles	Cobol	No	No	No	No	Yes	No	None	No	None	Yes	$150
Pansophic Systems, Inc. (312) 505-6000	Telon	Application generator	Yes	Excelerator, Nastec Designaid, McDonnell Douglas Prokit	IBM AT, PS/2 and compatibles, mainframes running MVS	Cobol, PL/I	Queries	Both	Yes	Yes	Yes	No	None	No	Unit testing	No	$100,000 to $300,000

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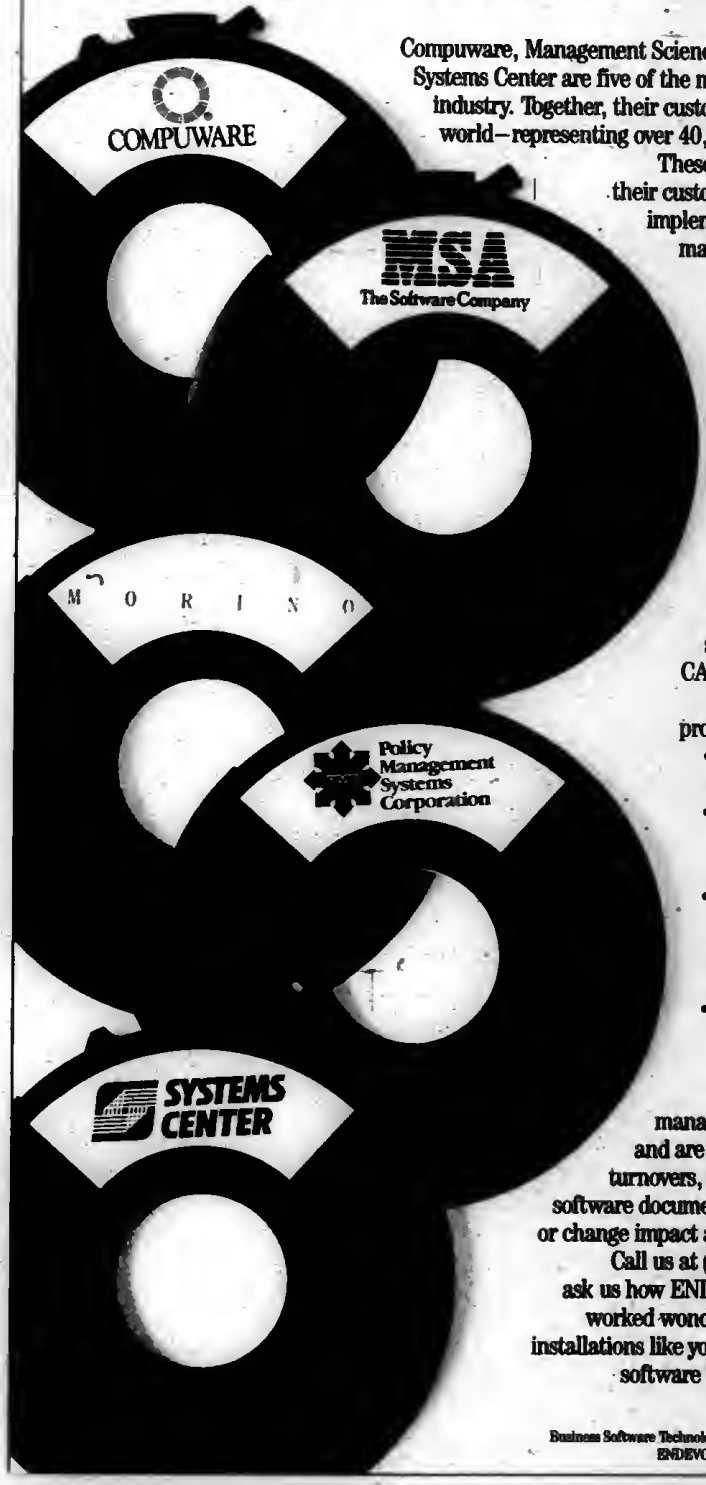

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Paul Mirabile Advanced Technology (312) 930-1000	Patrol	Re-engineering tool	No	No	IBM, Honeywell, Unisys, Wang mainframes; IBM PC/XT/AT, PS/2 and compatibles	Cobol	No	No	No	Yes	Yes	Yes	None	No	None	No	$8,000 to $32,000
	Retrofit	Reengineering tool	No	No	Same as above	Cobol	No	NP	Yes	Yes	Yes	No	None	No	Logical equivalency tests	No	$24,000 to $99,500
	Goldrun	Application generator	Yes	No	Unix; IBM PC LAN, MVS/TSO; DEC VAX, Unisys, HP	Cobol	Yes	Both	Yes	Yes	Yes	No	None	No	Populates production environment with test data	No	Starts at $54,000
Phoenix Technologies Ltd. (800) 843-3787	Phlash	Runtime performance analyzer	No	No	IBM PC/XT/AT, PS/2 and compatibles	Any	No	No	Yes	Yes	No	No	None	No	None	Yes	$395
Polytron Corp. (800) 547-4000	PVCS	Full life cycle product	No	No	IMB PC/XT/AT, PS/2 and compatibles, AIX, DEC VAX/VMS; Macintosh; Sun/OS	C, assembler, Pascal, Fortran, all modular languages	No	No	No	Yes	Yes	Yes	None	Yes	Building provisional versions, branching, comparing	No	$395 to $995
	Poly DOC	Full life cycle product	No	No	IBM MS-DOS and compatible machines	C, assembler, Pascal, Fortran, all modular languages	No	No	No	Yes	Yes	Yes	None	No	None	No	$199
	Poly Make	Full life cycle product	No	No	IBM PC/XT/AT, PS/2 and compatibles, AIX, DEC VAX/VMS, Sun/OS	C, assembler, Pascal, Fortran, all modular languages	No	No	No	No	Yes	Yes	None	No	None	No	$149 to $995
Programming Corngan, Inc. (516) 467-5300	Clint	Source code formatting tool	No	No	IBM PC/XT/AT PS/2 and compatibles	C	No	No	No	Yes	No	Yes	None	No	None	No	$129
Pronod, Inc. (800) 255-2020 (800) 258-4310 (Calif.)	ProSource & Pro Cap	Code generator, reengineering tool	Yes	No	DEC VAX/VMS, MS-DOS machines	Ada, C	NP	Both	Yes	Yes	Yes	Yes	None	Yes	Traceability to test plan for requirements phase	Yes	From $995
Quality Consultants, Inc. (800) 336-3772	Artesse	Application generator	No	No	HP 3000	Cobol	Both	Yes	Yes	Yes	Yes	No	None	No	HP	Yes	$20,000 to $45,000
Quantitative Technology Corp. (800) 635-3081	Software Foundry	Code generator	No	No	Sun, Apollo workstations, DEC VAX	C	No	Both	Yes	No	Yes	No	None	No	None	Yes	$40,000 to $75,000
Rexim, Inc. (212) 346-0642	Realia Cobol	Testing tool	No	Flexus Cobol, Magec, Netron/CAP	IBM PC and compatibles	Cobol	No	No	Yes	No	Yes	No	None	No	Interactive debugger	Yes	$995
	Real DL/I	Testing tool	No	NP	IBM PC and compatibles	Cobol	No	No	No	No	Yes	No	None	No	NP	Yes	$995
	Real CICS	Testing, maintenance development tool	No	NP	IBM PC and compatibles	Cobol	No	No	No	No	Yes	No	None	No	Interactive debugger	Yes	$995
Reasoning Systems, Inc. (415) 494-6201	Refine	Full life cycle product	No	No	Sun-3/4, Macintosh II, Symbolics, Texas Instruments Explorer	Refine (proprietary)	No	Both	Yes	Yes	Yes	No	Rules, object-oriented programming, logic	Yes	None	Yes	$10,000 to $15,000
Sage Software, Inc. (800) 638-8703	APS Development Center	Application generator	No	Excelerator, IEW, Asyst	IBM PC/XT/AT, PS/2 and compatibles, MVS mainframes	Cobol	Yes	Both	Yes	Yes	Yes	No	None	Yes	None	Yes	$5,000 to $300,000
Sanders Intelligent Systems (215) 674-1297	Prodoc	Full life cycle product	No	ASCII export/ export on any tool	MS-DOS machines, Unix available on customization basis	Pascal, C, Ada, Fortran, Cobol	NP	Both	Yes	Yes	Yes	No	NP	Yes	Dynamic simulation of design	Yes	$8,400
Softlab, Inc. (415) 957-9175	Maestro	Code generator	Yes	Any mainframe or PC package	IBM PC/XT/AT PS/2 and compatibles, DEC mmn running Unix	Any	Limited	Both	No	Yes	Yes	Yes	Built-in, rule-based language	Yes	On-line script managers, test data generators, host evaluation	Yes	NP
Software AG of North America, Inc. (703) 860-5050	Natural Construct/ Natural/Predict	Application generator, data dictionary	Yes	No	All IBM, Siemens mainframes; DEC VAX, Microvax; Wang VS	Natural, Cobol, PL/I	Yes, when using DB2 interface	On-line	Yes	Yes	Yes	No	None	Yes	System checker, interactive testing facility	No	$3,000 to $25,000
Software Business Applications (312) 863-4020	Vresearch	Code generator	No	No	Wang VS	Cobol RPG	No	Batch	Yes	No	Yes	No	None	No	None	No	$400
The Software Consortium (213) 823-0634	The Programmer's Helper	Application generator	No	No	Any Pick-based machine	Pick basic	No	On-line	Yes	Yes	Yes	No	None	Yes	Unit testing	Yes	$995
Software Intelligent Systems, a division of Galeo Corp. (800) 458-7206	Protool/Online	Code generator	No	No	IBM PC/XT/AT, PS/2 and compatibles	Cobol	No	On-line	Yes	Yes	Yes	No	None	No	None	Yes	$3,000
Software Research, Inc. (310) 871-8136	Micro-CAPS	Code generator	No	No	Unisys B25 series	Cobol	No	On-line	Yes	Yes	Yes	No	None	No	None	Yes	$1,995
SPS Software Products & Services, Inc. (212) 686-3700	EPOS	Full life cycle product	NA	Autocad, Change Configuration Control (CCC)	DEC VAX, Sun, Apollo workstations, HP 9000; Data General MV series; IBM 370, 4381, AT and compatibles	Ada, Pascal, Fortran, C	No	Both	Yes	Yes	Yes	Yes	None	Yes	Code feedback	Yes	$8,500 to $61,000
Sterling Castle (800) 723-7888	Logic Gem	Full life cycle product	No	No	IBM PC/XT/AT, PS/2 and compatibles	Interpretive, structured Basic; C; Pascal; Fortran; Dbase	No	On-line	Limited	Yes	No	No	Expert system shell with auto rule base completion	No	Logic interpreter for rules verification	Yes	$198
Synaptic Consulting, Inc. (212) 779-1548	R.A.P.	Code generator	No	Excelerator	IBM PC/XT/AT, PS/2 and compatibles	Cobol, CICS	Yes	Both	Yes	Yes	No	No	None	No	None	Yes	$3,995
Synergy International (800) 722-7887	Silver Stop	Full life cycle product	No	No	IBM AT, PS/2 and compatibles	C	No	On-line	Yes	Yes	No	Yes	Design validation, consistency checking	Yes	None	No	$5,000

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Teledyne Brown Engineering, Inc. (800) 726-1613	Tags	Full life cycle product	No	No	DEC, Apollo and Sun workstations	Ada, any with manual coding	No	Both	Yes	Yes	Yes	No	None	Yes	Diagnostic analyzer, error checks, discrete event simulation	Yes	$12,500
Texas Instruments, Inc. (214) 575-4404	Information Engineering Facility	Full life cycle product	Yes	No	All IBM mainframes and plug compatibles	Cobol	Yes	Both	Yes	Yes	Yes	Yes	Consistency and completeness/ rule checking	No	Interactive code tests, on-line debugging, logic tracing	Yes	$340,000
Transform Logic Corp. (800) 825-6443	Transform	Code generator	Yes	Excelerator, Prokit (McDonnell Douglas)	IBM MVS, MVS/XA	Cobol	Yes	Both	Yes	Yes	Yes	Yes	None	Yes	None	No	$100,000 to $300,000
Travtech, Inc. (203) 277-9595	Analyzer	Testing, coverage analysis tool	No	No	IBM 3270 mainframes	Cobol	No	Both	No	Yes	Yes	Yes	None	No	Inserts code in program to trace and count	Yes	$12,500
	Traps	Testing tool	No	No	IBM PC/XT/AT, PS/2 and compatibles	Any	No	On-line	No	Yes	Yes	Yes	None	No	Capture, replay and compare on-line screens	Yes	$18,000 (for 5 copies)
	Screenboard	Testing tool	No	No	IBM PC, mainframes	NP	No	NA	No	Yes	Yes	Yes	None	No	Code quality rating	No	$12,500
Verilog USA (800) 367-8371	Gnats	Code generator	No	No	Apollo, HP 9000, Sun, DEC VAX	C	No	Batch	Yes	Yes	Yes	No	None	Yes	Debugging, simulation	Yes	NP
	Logiscope	Re-engineering, testing tool	No	No	Apollo, HP 9000, Sun, DEC VAX, IBM mainframes	Ada, assembler, C, Cobol, Fortran, Pascal, PDL, PL/I, PL/M 80	No	NA	No	Yes	Yes	Yes	None	Yes	Test coverage analysis	Yes	NP
Ventanic, Inc. (800) 365-3682	Pro-C	Full life cycle product	No	No	Any running Unix, Xenix, MS-DOS, Quantum QNX	C	NP	Batch	Yes	Yes	Yes	No	None	Yes	None	No	$675
Wasoft, Inc. (800) 622-6962	Vis/Coster	Re-engineering, testing tool	Yes	No	IBM running MVS	Cobol	No	No	No	Yes	Yes	Yes	None	No	Validates integrity of new logic and data, verifies logic and execution flows	Yes	$99,500
Wang Laboratories, Inc. (508) 459-5000	Pace	Application generator	No	No	Wang VS	Pace, Cobol	NP	On-line	Yes	Yes	Yes	No	None	No	On-line prototyping and testing	Yes	$6,000 to $78,000
Xanalog Corp. (617) 986-8722	Xanalog Graphics to Fortran Generator	Application, code generator	No	No	IBM PC/AT, PS/2 and compatibles	Fortran	No	Both	Yes	Yes	No	No	Checks dynamic simulation	Yes	Live wave form displays, single stepping by time frames	Yes	$7,000
Yourdon, Inc., a Kodak company (212) 391-2820	Cradle	Code generator, analysis, design, configuration management	Yes	No	Apollo workstations/ Aegis	C, Ada, Pascal	No	On-line	No	No	Yes	No	None	Yes	None	Yes	NP

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Vaughan Merlyn

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Improving VM performance

Experienced users point out ways to optimize virtual machine uptime

BY TREVOR EDDOLLS

MARK HEMPSTEAD

Have you measured how well your VM system is doing lately?

The performance of IBM's Virtual Machine (VM) mainframe operating system is often complicated by the very facilities that make it such a versatile system in the first place.

Keep in mind, however, that VM is not in the true sense an operating system at all, but is a control program that manages real resources — tape drives, disks and so on — and allows other software to run under it and share these real resources. Even so, sometimes resource management gets bogged down by other considerations and consequently, performance lags.

Today's VM users are uncovering various performance gaps in the system, and they are also developing original solutions to overcome them. Indeed, improving the overall performance of their VM systems is a task users always seem ready to tackle.

One of the prime concerns of many users is producing a VM monitor that exactly fits the requirements for their sites at a particular time. VM has a monitor built into it as part of the control program. This allows data to be collected in two ways — either by state sampling or event recording. Within this setup, there are a number of classes that can be used to produce information on certain performance areas.

Examples of some of the ways that users have tried to improve VM performance are described herein, including technical details.

When the CPU is working, it may be in either problem state or supervisor state. Problem state means that it is processing work for a virtual machine — this could be work being done by a conversational monitor system (CMS) user or a guest operating system. When the processor is in supervisor state, it is processing control program work, and this is usually considered to be the overhead of running VM compared with running a guest system native — that is, running a guest on the same hardware without VM being loaded first. Both the control program and any of its guests can go into a wait state, which might mean there is nothing to do. It is either waiting for work or waiting for an I/O to complete so that it

Eddolls is the editor of *VM Update*, a monthly technical journal published by Xephon Technology Transfer Ltd. in Newbury, England. Xephon's U.S. representative is MJH Computing Services in Winter Park, Fla.

- **Writing creative EXEC programs**
- **Watching out for balanced CPU usage**
- **Wrangling over brimming spool files**

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can continue.

Bernard McIlroy, a systems programmer at Progress Lighting, Inc., a light fittings manufacturer in Philadelphia, wrote an assembler program that shows what state any given virtual machine is in. Progress uses the program for information about both its guest VSE system and its disconnected virtual machines — that is, those without terminals attached.

The program also shows how much real storage is being used by a guest operating system. The amount of paging taking place can be controlled by using the various SET commands provided by the control program. In this way, the performance of Progress' VSE guest can be improved, as can the performance of its important IBM CICS system, which runs under VSE.

Michael Kilroy, also a systems programmer at Progress Lighting, wrote an EXEC program that examines control program storage. The EXEC enhances the Diagnose 4 instruction, which is a special command that examines control program blocks in storage. Diagnose 4 is limited because it can return only full words,

TODAY'S VM USERS are uncovering various performance gaps in the system, and they are also developing original solutions to overcome them.

and the address of each word must be specified in the parameter list. Kilroy's EXEC is especially useful if poor performance is reported and it becomes necessary to scrutinize control blocks in control program storage.

Users find problems first

Most data processing departments prefer to identify problems before members of the user community do. However, many find themselves restricted by budget limitations and the number of operators available.

To solve this problem, one manager of IBM system software at a large consumer electronics company supplied some useful rules and a short EXEC that allows a site to build its own monitor.

He suggests that a VM user identification code be dedicated to running the EXEC, which loops continuously. The best method to adopt, he adds, is to identify key resources, then decide what constitutes a problem state with the resource. This may be, for example, a network line that was off-line or disabled. Finally, the software manager says, decide how frequently the resource needs to be checked.

Note, however, that regular checking carries a much higher CPU overhead than occasional checking. When the monitor identifies a problem, corrective action can be taken and performance will not deteriorate.

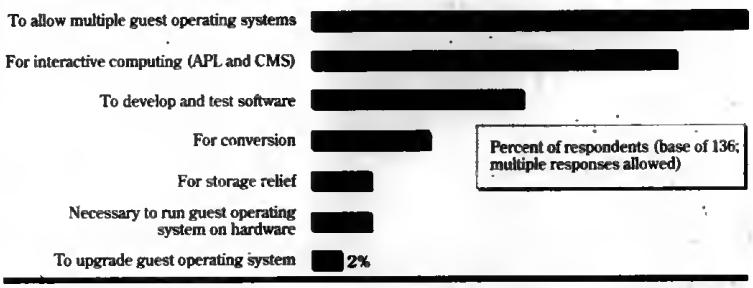
Alan Kauf-Stern, a systems programmer at Paz Oil Co. in Haifa, Israel, had a similar solution in mind when he wrote a number of EXECs that run continuously and alert staff if site-determined threshold values of system resources usage are exceeded.

The EXECs automatically monitor all virtual machines and their usage of resources such as CPU utilization, I/O rate and paging rate. The EXECs run in a disconnected VM and loop continuously, taking data from IBM's VM/Real-Time Monitor. Threshold values are easily specified in parameter files. If they are exceeded, remedial action can be taken immediately to improve performance. The data collected can also be used for future capacity planning.

This solution was taken a step further by Wesley R. Scott, a systems programmer at NBD Bancorp, Inc. in

Why did you select VM?

A recent survey of VM users shows the major reasons the operating system is installed in their shops



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Detroit, who wrote a program that takes system resource snapshots and reports on elapsed consumption since the setting of a particular resource point — usually the last report.

He also developed an EXEC that uses the data from the first program to produce a detailed list of resources used and the cost accumulated. This is used for billing users. The amount charged for each resource can be modified easily.

The point of using such a program is that users tend to be less excessive with their usage of system resources when they see both how much it costs them and that the reduction in overall use means an improvement in the performance of the fewer virtual machines that were using the system at any given time.

USERS TEND TO BE less excessive with their usage of system resources when they see both how much it costs them and that the reduction in overall use means an improvement in performance.

Keeping CPU use in balance is a VM problem that was tackled by George Perkins, a senior technical services specialist at Oscar Mayer Foods Corp. in Madison, Wis. Perkins wrote an EXEC that dynamically changes the priority of a CMS user based on CPU usage. This EXEC is used to ease pressure caused by, for example, a CPU-intensive database query system. The EXEC does not include special-service machines and guest operating systems.

If a virtual machine is deemed to be using too much CPU for the system's good, its priority level is reduced to 70, where 1 is the highest priority, 100 is the lowest and 64 is the default priority level. If a machine is not adversely affecting the CPU, its priority is set to 64.

Duane Ternes, technical support supervisor at Cascade Corp., a forklift parts manufacturer in Portland, Ore., wrote an EXEC that creates a formatted and interpreted display of in-queue users from the "control program indicate users" command — better known as CP IND USERS.

The display can be refreshed automatically. It also displays whether users are FAVORed or have QDROP OFF status; FAVOR and QDROP OFF are keywords that indicate user status. A user who is FAVORed will always be added to the queue when ready to run. This situation ignores the size of the user's working set — the number of real storage pages it requires. If the percentage option is used with the command, the control program will try to ensure that the user gets that percentage of system CPU resources.

The QDROP OFF option has the effect of keeping some of a user's pages in real storage when the user comes to the end of an active period. When the user next wants to be active, some of his pages will already be in real storage, and so processing can start sooner. Both these methods can be used to improve VM performance, although they usually result in some decrease in the performance of all the other virtual machines.

I/O problems

Backed-up I/Os can also affect VM performance. For example, when IBM's VM/370 initiates an I/O, it will try to access a channel and then a control unit and then the device. If any part of this path is already busy performing an I/O operation, the new I/O will be put into a queue.

With the older, less sophisticated Start I/O command, this information would have been sent back to the control program, which would have tried to access the device using an alternate channel, where available. With the more modern Start I/O Fast command, the attempted I/O is queued in the first channel, and the control program does not know that it is queued and so does not try to send it down the alternate channel. Therefore, even if there is an available path, the I/O will not use it and will wait until the first path is available.

John Illingworth, chief systems programmer at Empire Stores Ltd. in Bradford, England, has implemented a modification to the control program that flip-flops the paths for a device for every I/O request.

What this means is that, in effect, every other I/O request will start with the alternate channel. With IBM's VM/High-Performance Option (VM/HPO) Release 3.4 and above, the modification is made to the module known as DMKIOQ. The effect of this modification is to attempt to balance I/O and improve performance by reducing the likelihood of an I/O being queued in a channel when an alternate path is available.

In addition to I/O difficulties, the spool file can often be a source of woe to VM sites. The spool file can contain print files, punch files and reader files for every user. Spooling also uses the paging subsystem for I/O, and what appears to be excessive paging rates can be caused by excessive spool usage. Each spool file has a naming device, or SPBLOK, associated with it.

With IBM's VM/System Product, these can fill up the Free Storage Area in the CPU, causing free storage extends that not only take away page frames from the Dynamic Paging Area (DPA) in the

Continued on page 94

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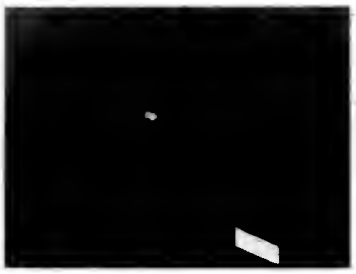

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ne Spreadsheet portant Update.

to be precise. Linking either in memory or on disk, either pages of the same spreadsheet or independent, either SuperCalc5's files or Lotus® 1-2-3®'s.

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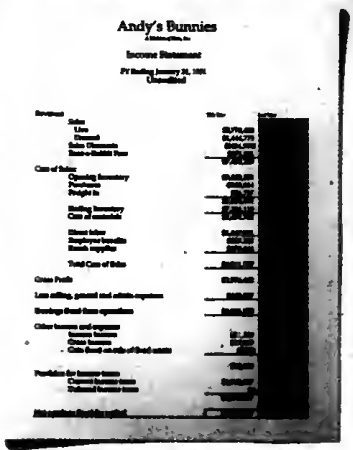

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Which finally brings us to our admittedly biased outlook for the much touted spreadsheet war.

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Stages in the quest

There are five basic stages IS goes through in the process of improving VM performance:

- The first and most obvious step is understanding how the installed software and hardware work.
- The second stage is knowing how to measure exactly what is going on and then doing so.
- Stage three is deciding what the performance requirements actually are and what is the most important work on the system. This can be judged in terms of business costs and business image. For example, if members of the public are using a terminal for any reason, they will perceive the response time of that terminal as indicating the performance of the company as a whole.
- The fourth stage is evaluating the measured results and comparing them with the performance requirements.
- The last stage is the tuning stage. This is the time when changes are made to the system. It is also the time when more serious modifications to the system are planned. These could include introducing new hardware, upgrading the CPU, installing new software programs or installing new versions of the control program.

After that, the VM performance improvement process will cycle around to stage two and then continue ad infinitum.

TREVOR EDDOLLS

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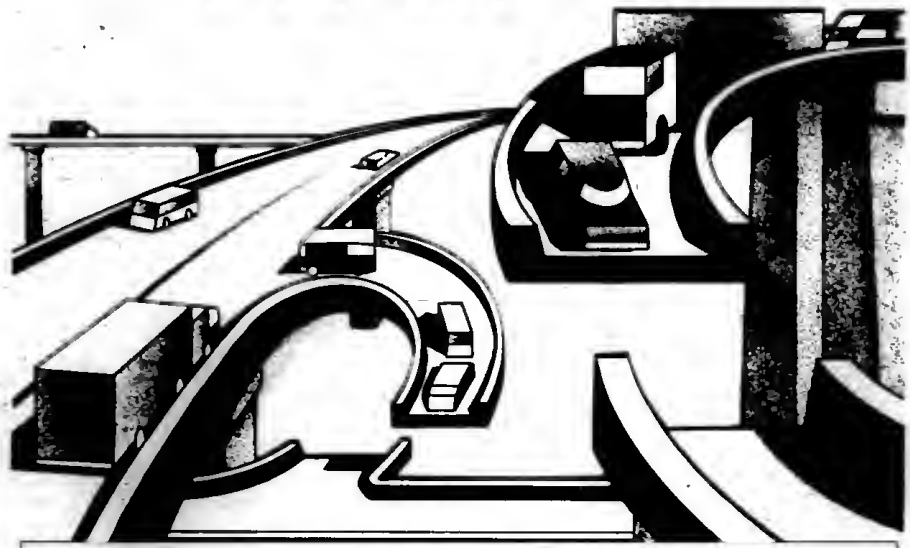

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Performance

CONTINUED FROM PAGE 91

CPU, but also halt user work during the process, thus reducing performance.

Many CMS users treat the spool as a mini-disk-overflow area. With VM/HPO, problems can be increased because up to 9,900 spool files per user can be supported. However, also with HPO, SFBLOKS are stored in the DPA, so free storage extends are less frequent. With IBM's VM/Extended Architecture, the spool is also used for printer File Control Blocks and Universal Character Sets, control program monitoring data, dumps, Discontiguous Saved Segments (DCSS), saved systems and the user-class override file. If the spool file fills up, the system could crash. Messages about the spool area's capacity are sent only when the spool is 90% and 100% full — which is probably too late.

To counteract this problem, W. H. Sau, computer projects officer at Cathay Pacific Airways Ltd. in Hong Kong, wrote an assembler program that interrogates the control block areas known as DMKPGTTM and DMKPGTTU and displays the current spool utilization. Because this information is available, VM should not crash just because the spool file is filled. Therefore, performance should be improved.

Discontiguous Saved Segments can be used as a way of greatly improving performance for many users. Without a DCSS, each user who wants to use a particular program has to call the program, retrieve it from disk, load it into his virtual storage area and then page it into real storage for execution. With a DCSS, the code is loaded into an area of storage and the programs in it can be used by any authorized user. This saves time and increases productivity and overall performance.

However, systems programmers must take care that DCSSs do not overlap in storage and that they can contain all the programs that are to be loaded into them. The names of all DCSSs are kept in the DMKSNT configuration file.

VM directories

Every virtual machine that can run on a particular system must have an entry in the system directory. This can be a very large file on a system with a large number of CMS users. Its maintenance can be difficult and time-consuming, and mistakes can easily be made when coding a new mini-disk statement.

Werner Saumweber, a consultant with Sqare Computer Consulting in Aichach, West Germany, wrote a program that checks the disk-map file for mini-disk overlaps and sends a message to the initiating user if it finds any. It ignores any messages from either the MAINT user ID or the DASD Dump Restore backup program. A second program searches the disk map for gaps and writes a record showing the amount of free space on each pack. This information can then be used to allocate new mini-disks. The use of these programs can improve the performance of VM systems programmers.

These examples represent some of the many ideas about VM performance that have been passed on by practicing VM experts. They illustrate the wealth of highly technical knowledge about VM and the variety of ways that different sites have found to enhance the performance of their systems. ●

INDUSTRY INSIGHT

Charles Varga

Whither MIS' kingdom?

Recently, the right side of my brain sparked a heated debate with the left side over the future of MIS folk and chief information officers.

It is a future that could create opportunities for entrepreneurial systems integration vendors that are smart enough to gauge the debate and aim their wares and services at its resolution.

Mine is not the first brain on the block struggling with the question of where MIS is headed. One current view, for instance, holds that MIS is no longer an arcane, disciplined tool in and of itself whose proponents enter as apprentices or novices and proceed to become chief information abbots. There is much less excitement these days behind the heavy-duty, centralized, glass-roomed MIS walls. Daniel Lavery, principal consultant at Palo Alto Management Group, puts it this way: "The bottom line is that the MIS kingdom has hit its natural limit. The MIS guy is rapidly at-

Continued on page 99

Bytex vies for role in network control

BY HELEN PIKE
CW STAFF

SOUTHBORO, Mass. — Like a play within a play, Bytex Corp. is wrestling for more control of the network-control market by broadening its product line and preparing to go public after nine years as a private company.

Bytex makes electronic matrix switches, connectors that funnel digital and analog cables through two or more of a data center's front-end processors to end users. It helped pioneer that segment of the network-control market, which is valued at $87.7 million, according to 1987 figures from International Data Corp. (IDC), a research concern in Framingham, Mass.

"We're really sitting in the interface between datacom and DP," said Jeffrey S. Goodman, Bytex's president and chief executive officer, about the use of company products.

But Bytex, which earned $3.8 million on revenue of $34.4 million in 1988, does not sit there alone — even with the largest market share, an installed base of more than 1,000 of its basic switches and 300 customers.

The growing corporate reliance on networks — especially in the financial, transportation, telecommunications and manufacturing markets — has pitted Bytex and six other OEMs in a fierce contest for a piece of the purse, said IDC analyst Kathryn Korostoff, who specializes in network-switching systems.

"The issue is how to reposition matrix switches beyond being just a front-end processor device," she said. "It's an extremely price-competitive market. MIS managers clearly can get a good deal if they want to play that game."

Bytex competitors include Infotron Systems Corp.; Telenex, a subsidiary of General Signal Corp.; Codex Corp.; Dynatech Corp.; and Datatran, a new company from Australia. Perhaps its most formidable competitor is Data Switch Corp., a publicly traded company headquartered in Shelton, Conn., that netted $3.3 million on revenue of $113.8 million in 1988.

However, Goodman said, "We have the technical advantage. In three to six months, they could close the gap, but their design approach is different. They're locked in to what they have."

Goodman directs a company that has no long-term debt, $14.8 million in working capital at year-end 1988, 240 employees and a research and development budget of about $5 million.

Bytex's Goodman

A spate of product announcements is expected in April. In May, Bytex will launch an initial public stock offering from which it hopes to raise $10 million to expand its presence in the data communications business.

To expand its business beyond the matrix switch market, Bytex has done the following:

Continued on page 100

Grappling for more of the market

Despite a slight dip in income in 1986, Bytex's financial record suggests continued growth as the firm expands its product line and prepares to compete in the public arena

	1984	1985	1986	1987	1988
Net sales	$11.1M	$24M	$24.9M	$28.8M	$34.5M
Net income	$0.4M	$1.8M	$1.1M	$1.8M	$2.3M
R&D expenditures	$2.4M	$5.4M	$5.1M	$4.4M	$5M

SOURCE: BYTEX CORP. CW CHART: FRANK C. O'CONNELL

Encore set to buy Gould for $175M

BY ALAN J. RYAN
CW STAFF

MARLBORO, Mass. — Mini-supercomputer manufacturer Encore Computer Corp. last week announced its intent to purchase the business of Gould/Computer Systems, Inc. from Nippon Mining Co. Ltd. of Tokyo, a move that analysts said could increase Encore's sales by a factor of nine.

Encore, which reported $34 million in sales and earnings of $1.8 million in fiscal 1988, said it will pay $140 million in cash and 10.6 million to 11.3 million shares of Encore stock worth roughly $35 million.

For the purchase, Gould, based in Ft. Lauderdale, Fla., will loan the $140 million in cash to Encore, which will repay the debt through a one-year bridge loan, Encore spokeswoman Mary Kae Marinak said.

If the agreement is consummated, Encore will gain Gould's "extensive sales and distribution in foreign countries, especially in Europe," Marinak said. She also said that there is a synergy between the product lines of both companies. Gould sells supercomputer and Unix-based real-time systems with a focus on defense and avionics applications. Encore manufactures the Multimax family of parallel-processing computer systems.

Nippon Mining purchased Gould, an American diversified electronics company, last year because it wanted its copper foil business, said analyst Ramakrishna P. Kasargod of Morgan Keegan in Memphis, adding that Nippon had never intended to hold on to Gould's computer business.

"Some of the governmental agencies were a little skittish about purchasing sensitive equipment from the Japanese" after Nippon purchased Gould, Marinak said. "That was one of the factors that brought Nippon to the table."

For the coming year, until Encore pays off its bridge financing, Nippon will maintain a stake in Encore, Kasargod said. However, he said he does not believe that Encore will be vulnerable as a takeover target because of the debt: "It looks like [Encore Chairman] Ken Fisher is trying to build a big company here."

Kasargod said the prospect of Encore taking market share from such competitors as Prime Computer, Inc., Data General Corp. and Digital Equipment Corp. will bear close watching.

Marinak said the transaction will be completed this week if certain conditions are met, including approval of the respective boards of directors and commitments for added financing.

Urge to merge strikes Multiflow, Adage

BY JAMES DALY
CW STAFF

BRANFORD, Conn. — The mating game continued to be played in earnest last week as supercomputer maker Multiflow Computer, Inc. and workstation manufacturer Adage, Inc. announced plans for a merger, with final shareholder and Securities and Exchange Commission approval expected within four months.

Under terms of the agreement, the stockholders of privately held Multiflow will receive shares of common stock in Billerica, Mass.-based Adage, which will go under the Multiflow name. Multiflow will ultimately own 60% of the voting securities of the combined corporation; Adage will control 40%.

If all goes according to plan, Adage President and Chief Executive Officer James D. Norrod will serve as president and CEO of the combined company, while Multiflow President and CEO Donald E. Eckdahl will become chairman of the board.

Company officials would not offer specifics on whether the merger will require transfers or cutbacks of Adage's 140 employees or Multiflow's 130 workers.

Although both companies called the move a complementary business merger, they said there was no intention to design or offer combined products. "The merger is strictly a business proposition; we'll think about product integration later," said Joseph A. Fisher, executive vice-president of Multiflow.

Multiflow designs and manufactures the Trace family of high-performance departmental supercomputers; Adage supplies high-performance IBM-compatible graphics terminals.

Fisher discounted speculation that the proposed merger would represent a move by Multiflow into the visualization area. "Adage's graphics expertise will ultimately strengthen Multiflow's visualization capability but won't change the company's market focus in any fundamental way," he said. "Multiflow will continue to adhere to all major standards, and our emphasis will be on open systems."

Recently, an information management revolution occurred at the University of Wisconsin–Stevens Point. Dan Goulet from the University and Jim Leonhart of AT&T—campus radicals of a different kind—explain how they were able to realize a bold and complex vision.

These men started a revolution on campus.

FEBRUARY 22, 1989

Jim: I remember the first day we met. You had been around the block a few times, but weren't getting the answers you needed.

Dan: We wanted to create a unique education environment: a free-flowing on-line computer campus. We had a vision, and we were looking for someone to help build it.

Jim: A distributed networked computing solution, that's what we'd call it now: a way to process, move and manage information effectively, throughout a widespread organization.

Dan: We talked to many computer vendors before you. We got tired of describing what we needed, so we drew it. That graphic was about 13 feet long.

Jim: More like twenty. The chart showed every information resource on campus linked together, accessible to students, faculty, and administration. It became the wallpaper in my office for fifteen months.

Dan: It was like a blueprint for a data superhighway.

Jim: We put our ISN wide-area network at the center—like an interchange—and built fiber and twisted-pair data lanes to applications running on AT&T 3B2s, DEC, UNISYS and other hosts located in all the departments. We put on- and off-ramps in strategic locations: StarLAN networks that gave access to the highway from workstations.

Dan: We designed everything from the user perspective. The more technically remarkable the system became, the harder we worked to make it approachable.

Jim: Easy for novices, powerful enough for programming students.

Dan: We developed a menu-driven user interface that is consistent and clear. Students and faculty can select applications like checking spelling, transmitting course grades, even browsing through the on-line card catalog of 1.5 million books at the University of Wisconsin–Madison. We wanted desktop power and access, but we wanted to process information where it made the most sense.

Jim: Thinking back, we realized early that the complexity of your vision precluded a single-system focus. You needed open systems.

Dan: You were really the only ones that understood this point. Open systems allow us to use off-the-shelf components; vendors have to bid against each other to get our business. Open systems are the secret.

Jim: It's mind-boggling how much computer power is out there. We wanted to harness it all, yet give a piece to every individual.

Dan: A truly distributed network, one we don't think we'll ever outgrow. We've added 300 WGS workstations in the last five months.

Jim: Dan, where in the world is that wallpaper today?

Dan: We had it bronzed. Today, so many colleges and businesses really need a similar solution. That's probably why we've had so many visits from them lately.

Jim: Little did we know back then, when we first met.

Dan: Oh, something tells me you had a hint.

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THE SOLUTION:

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THE RESULT

Stevens Point has been designated a Center of Excellence for Distributed Academic Computing by the Board of Regents for the entire University of Wisconsin system. The majority of the 9000 students on campus regularly use the network for coursework and homework. Faculty have integrated computing into 41% of their coursework.

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Olsen blasts feds, graduates

BY JAMES DALY
CW STAFF

NEWTON, Mass. — Digital Equipment Corp. President Kenneth Olsen may never have been a pugilist, but he laced up his laissez-faire economic beliefs tighter than a pair of boxing gloves recently and took broad swings at both government and business schools for their debilitating and constrictive ways of thinking.

"Government always does the wrong thing," Olsen said with a wry smile during his address to the New England Council of the American Electronics Association. "But it is not worth being cynical and getting upset about, because we know enough to expect it."

Olsen censured the federal government for saddling industries with high corporate taxes, installing lopsided export fees and not extending financial assistance to an industry unless it is accompanied by commensurate political gain. "They only help areas like shoes, textiles and semiconductors — areas in which we never had any reason to want to be," he said during the 45-minute speech.

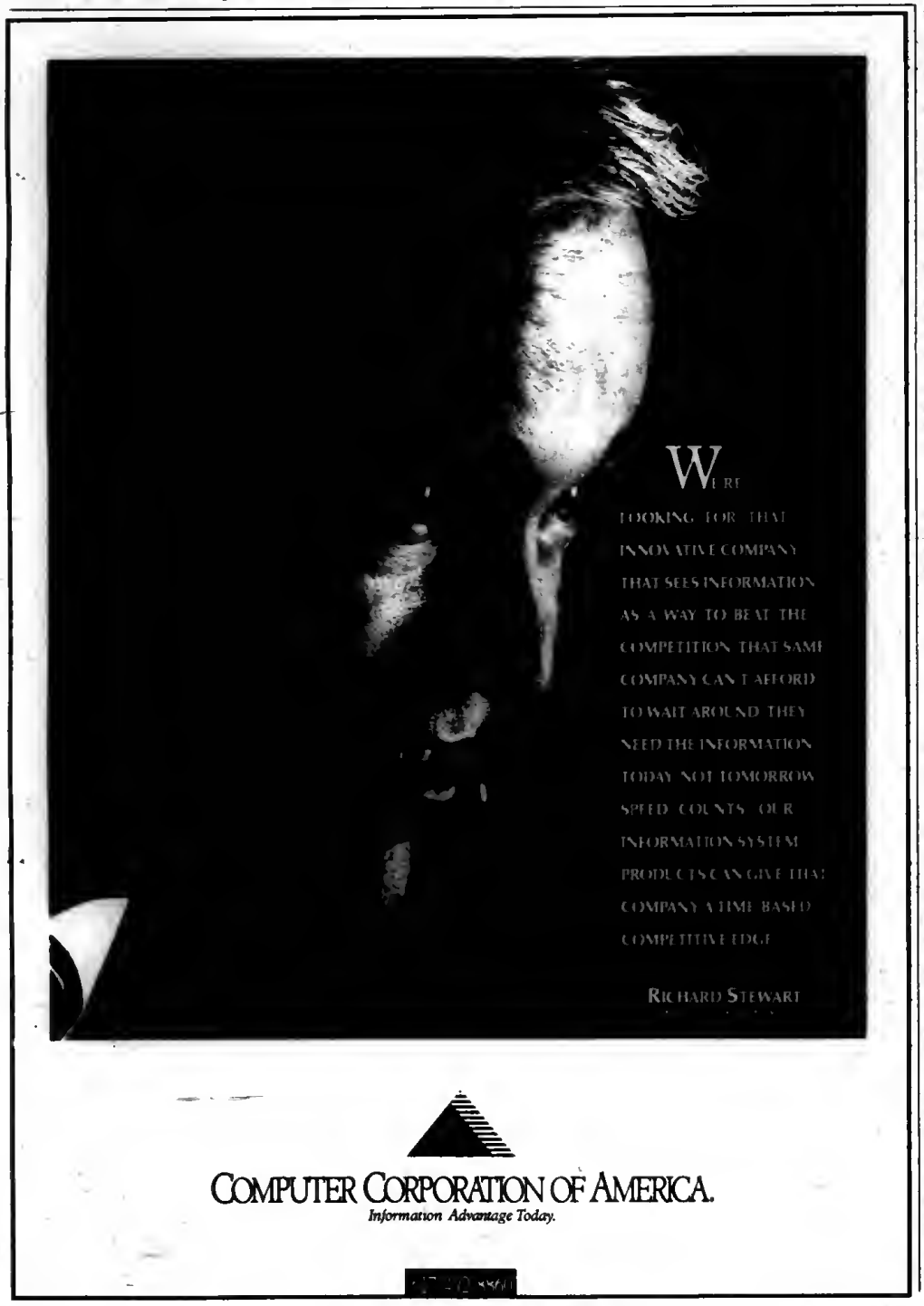
DEC's founder noted that such policies stem from a belief that profit-making is "evil," but such views may send out damaging economic ripples. "The importance of capital is everything," he said. "There are thousands of great inventions out there, but it's less important to think of them than get them into production."

Throw out the book

Business school graduates were Olsen's next target, and he scolded them for their overreliance on textbook theories. "The educational system is based on things you can measure, not innovation," he said. "Pie charts and spreadsheets are the worst things to happen to business. No one can read a pie chart, and graphs either prove something that is not true or prove nothing at all."

There was, however, some praise amid the barbs. High on Olsen's list are standards organizations. "They're like the United Nations; they take forever, but they are terribly important," he said.

Despite DEC's success thus far — since its founding, DEC has grown from three employees and 8,500 square feet of leased space in an old woolen mill to a computer industry giant with 121,000 employees worldwide — Olsen seemed to lend credence to recent industry rumors that DEC's upcoming financials may be flat. "We grow when demand is there, but we never set growth as our goal," he said.



No wrongful recruitment found at ICG

NEW YORK — A state Supreme Court justice last week ruled in favor of systems integration consulting newcomer The Information Consulting Group, Inc. (ICG), which was accused by Big Eight accounting and consulting firm Peat Marwick Main & Co. of wrongful recruitment.

According to Justice Bruce Wright, unless an employment contract is violated by the action, employees — particularly those in a hotly competitive market niche — can leave employers as they see fit.

Even with Wright on its side, however, ICG is not out of court. Waiting in the wings is a similar action against the company filed by Big Eight giant Arthur Andersen & Co.

In addition, ICG is expecting to see some court time from the plaintiff's side of the courtroom. Earlier this month, it filed a $300 million suit against Andersen, alleging unlawful interference with its business.

Varga

FROM PAGE 95

taining the same position as the guy who supplies building space or runs administrative services within a corporation."

In a sense, Lavery says, MIS is becoming a commodity. Who needs a CIO, he asks, when most companies are "happy with an MIS manager who can handle the IBM replacements? The MIS guy is basically a civil servant. It is just plain nonsense that MIS is going to become a kingdom whose CIO is the sovereign."

Hold on, now, says the left side of my brain. There are some serious problems with this theory. The reason people are fighting the MIS groups is that those people view planning and pragmatism as diametric opponents. They see it as much easier for a small department to get its budget passed when it's looking for minor financing; it's much easier for the troops on the line to do their own negotiating and get something down, dirty and quick.

A manager in a large, diversified financial services organization, who wishes to remain anonymous, summarizes the situation at his well-known shop: "Right now, we have an absence of a strong and effective core MIS organization. . . . We have fragmentation down to the departmental level. Everybody wants to build their own little power base."

If control has shifted to the departmental level, where is the planning? Where are the systems, procedures and standards?

It appears that what little organization there is has evolved out of the operating departments. These departments, made up of the people responsible for profit and loss, are now computer-literate.

The pendulum, according to Lavery, has swung away from MIS growth. "Centralized core organizations," he observes, "are not the light of the future."

The trouble is, the shift toward decentralized control has not solved the problems it addresses but has only restated them. Whether in big corporations or small departments, the fact remains that we are still dealing with a maze of roadblocks. Unless there is really some control, an organization and business plan and a commitment to get the job done, people will implement their own ideas and set their own agendas for everything from training, support and installation to cabling and communications.

"Because people feel it's a much easier to do it on their own, when they do finally start talking to one another, no one's talking the same language," the financial services company manager says. "The end result is that we have departments looking to become technological gypsies. They can fold their tents, take their equipment and move at the drop of a reorganizational hat."

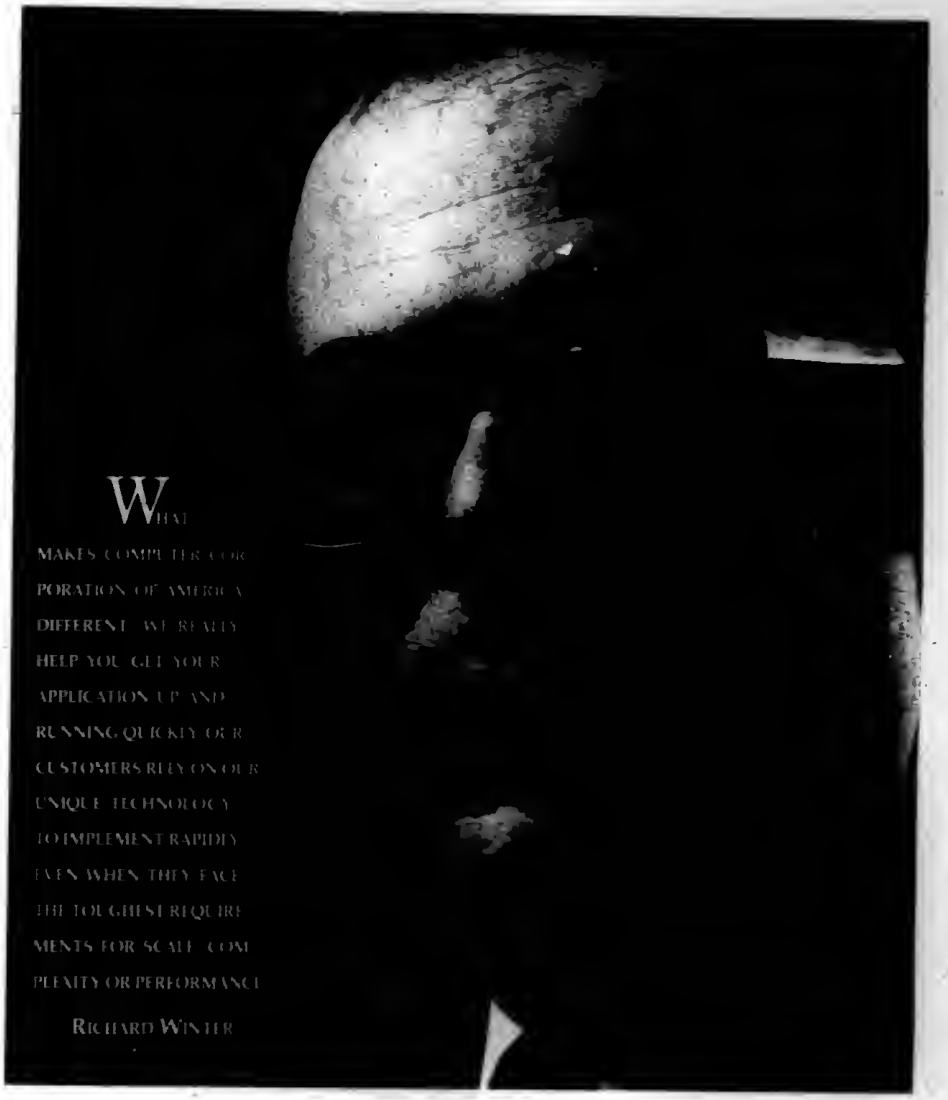
Thus, without a core organization and facility, our New Age MIS vice-president and CIO may find he has nothing to manage. Our manager in the large financial organization says, "Maybe what we need first is a Department of Redundancy. What's happening is that everybody is doing something with no organization. We have our own very good people, but the real reason that nobody knows what anybody else is doing is simply because nobody has dictated on top that everyone should know what they're doing."

What, ask the warring sides of my brain, is the solution?

Currently, there is none — unless MIS managers adapt and adopt the approach of working with departments and divisions to provide support at the organizational level required.

What might benefit all parties involved is a strategy that links emerging entrepreneurial systems integrators — vendors in the under-$10 million range — with department managers and with MIS managers willing and able to work with both. That's an idea that one brain can agree on.

Varga, a 20-year computer industry veteran based in Frenchtown, N.J., is publisher of "The Cerberus Report," a study of industry mergers and acquisitions.



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Bytex vies

CONTINUED FROM PAGE 95

- Brought out the Autoswitch/4000, a matrix device capable of handling 4,096 communications ports, up from the 3,840 ports in the original Autoswitch 240.
- Added fault-tolerant functions, recently expanded to include a disaster recovery component.
- Written network management software, called Unity, that is aimed at users of the industry-leading IBM Netview and AT&T Unified Network Management Architecture.
- Planned expansion of Unity to include T1 connections.

Bytex is also decreasing its OEM sales to IBM of its Autoswitch 240 while increasing direct sales to IBM customers of its AS 4000/1000 switches and Unity systems. In 1988, IBM OEM sales were $9 million, or 26.3% of Bytex's total revenue; in 1987, sales were $9.9 million, or 34.6% of $28.7 million revenue.

In 1986, with company sales hovering around $25 million, Bytex Chairman Steven G. Finn saw the need to bring in a more seasoned business staff. Finn, a one-time Codex engineer who joined former colleague Bang-woel Lu to launch Bytex, began the firm with $1.1 million from the Charles River Partnership in Cambridge, Mass. — a sum that resulted from a conversation on a plane ride between New York and Boston after an unsuccessful attempt to raise capital on Wall Street.

In 1987 Bytex hired Goodman, who as president of Software International Corp. stayed on through the company's transition from a General Electric Co. subsidiary to a Computer Associates, Inc. subsidiary.

Speaking of his new company's installed base and its growing voice and data networks, Goodman observed, "Our clients have a lot of external data sources."

Visa Corp. in San Mateo, Calif., uses a 4,000- by 4,000-port Bytex switch to transfer of funds and customer data. It is a system that cannot afford to go down.

"It has a lot of flexibility," said Janice Vander Brink, Visanet technical director, referring to its expandable size. "It can adjust to customer and market demands. It's an evolutionary implementation."

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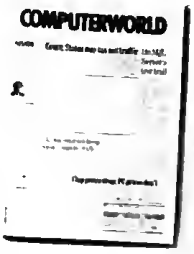

*Audit Bureau of Circulations Supplemental Data Report, May 25, 1987

IN BRIEF

Tate takes a bite

Last April, they made it official; now they're making it major. **Ashton-Tate Corp.** has increased its equity investment in **Interbase Software Corp.** and is now the majority owner of the Bedford, Mass.-based minicomputer database management system maker.

Call me Legent

File away all the "Duquesno" jokes — systems integrators **Duquesne Systems, Inc.** and **Morino, Inc.** last week announced the official consummation of their $400 million-plus merger and the name of the combined company: Legent Corp.

Two more chapters

Burdened with $43.8 million in fiscal 1988 losses and facing the end of its line of bank credit, IBM and Digital Equipment Corp. peripherals manufacturer **Scientific Micro Systems, Inc.** filed for Chapter 11 protection last week.

Following an adverse arbitration decision that threatened to leave the company minus a key software offering, personal computer local-area network vendor **Univation** announced its Chapter 11 intentions.

Making way

Citing incompatible management styles, **Sematech** Chief Operating Officer Paul Castrucci resigned last week to make room, he said, for Chief Executive Officer Robert Noyce to replace him with a COO of Noyce's choice. **Texas Instruments, Inc.** veteran Turner Hasty, who has held down several posts at Sematech, was named acting COO of the industry/government semiconductor manufacturing consortium.

On a quest

Minisupercomputer maker **Ebsi Corp.** last week retained an investment banker to seek strategic alternatives such as an equity or strategic partnership for the firm. Ebsi, which in recent years has focused its efforts on real-time applications for its System 6000 processors, is counting on its compact Model 6460 parallel processor to make it attractive to potential partners. Ebsi hired the investment banking firm of Houlihan, Lokey, Howard & Zukin Capital for its partnership hunt.

Worth noting

Inc. magazine named Apple Computer, Inc. co-founder and Next, Inc. founder Steve Jobs "Entrepreneur of the Decade."

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The vendor team's appeal

Commercial developers offer their software folks different strokes

BY SHERYL KAY
SPECIAL TO CW

While *Computerworld's* annual job satisfaction surveys indicate corporate information systems professionals tend to be happy at their jobs, software developers at vendors are quick to point to things they say make their work more appealing.

Many of these attributes are ephemeral, such as a sense of direct involvement with a well-known commercial product. "You get satisfaction because you are part of a team that has built something tangible," says Dave Curtin, a systems development manager at Must Software International in Norwalk, Conn. He has also worked with IS organizations as a consultant.

"Every time [the product] is sold, I get this feeling that I helped develop something that people are paying money for," Curtin says.

Another consideration is a vendor's name recognition. Having been employed by a highly regarded vendor can enhance a technical professional's reputation in the eyes of colleagues.

There is no uniform profile of the commercial developer or corporate IS professional. For either one, projects might involve user-oriented applications or internal software. Teams might work on all modules of a package or specialize in a subsystem.

Nevertheless, most people view vendors as different from IS departments. Perhaps the most conspicuous divergence is the less formal atmosphere at many vendors.

Candle Corp. headquarters in Los Angeles includes numerous coffee rooms "just to let people feel comfortable," says senior software engineer Marc Schare, who previously worked at AT&T's Bell Labs for eight years, four of them as a systems programmer.

Vicki Hayes, a recruiter at Professional Careers in Fayetteville, N.C., says she knows of a vendor that holds an annual California Day when all workers wear shorts, flip-flops and sun glasses to work.

Some developers at vendors contend their firms offer a more creative or challenging workplace. "One feels that he can be more creative in this environment because he's not being told by a user department, 'I want A-B-C done,'" says Chris Gruchawka, project manager of CICS Replay at Interactive Solutions, Inc. in Bogota, N.J.

Curtin says he lets his developers, who are working on the database Nomad, find the answer to a problem rather than providing it himself. Corporate users may dictate solutions to try to ensure programs are easy to use or developed quickly, he contends.

Vendors sometimes pay developers only to brainstorm or model a new idea, according to Hayes. "Even if it's off the wall, nobody is afraid to talk about it," she says. "This is how vendors break new ground."

Developers also say vendor shops tend to be less vulnerable to organizational politics than corporate IS organizations, which often support diverse and sometimes competing end-user departments. "Data processing is the entire business at a vendor," Curtin says.

The person best suited to develop software for a vendor should demonstrate abilities with low-level computer languages such as assembler, which form the source code of many products, according to developers. It is also important to possess some systems programming background in order to understand the interaction of applications with operating systems, particularly when a product will run on a variety of operating systems.

However, systems programmers in corporate IS departments who chiefly install and maintain products must show more to be strong candidates for vendor development. "It's a really different skill set," Schare says. "You're not integrating different packages from other companies. Rather, you are creating something out of thin air for marketing purposes, so imagination is critical."

Any prospective vendor developer would benefit from conceptual familiarity with the product being built, developers say. Exposure to a competitor's product would also be a plus.

Salaries for developers at vendors vary widely but appear in line with national averages for data processing professionals. A three- to five-year veteran of software vendors can earn $35,000 to $45,000 per year, according to developers and recruiters.

Vendors, particularly smaller ones, might be more likely than corporate users to offer a partnership or profit-sharing option, although sometimes these incentives compensate for slim salaries.

> "A PERSON WHO wants to work for a vendor wants to create technology, not necessarily solve end users' problems directly."
>
> STEVE JOFFE
> SOURCE EDP

Not for everyone

But working for a vendor is not for everyone, notes Steve Joffe, vice-president of recruitment firm Source EDP in Paramus, N.J. "A person who wants to work for a vendor wants to create technology, not necessarily solve end users' problems directly," Joffe says.

Sometimes, particularly as they age, developers at vendors get the urge to move to an IS organization, Joffe adds. "They no longer get their jollies out of doing purely technical work. It's gotten to the point where they want to see the big picture of how a business works."

Joffe sees slightly more developers moving from IS to vendors than vice versa, which he attributes to a greater number of start-ups among the vendors and information systems organizations' growing preference for packaged software over in-house development.

Kay is a Tampa, Fla.-based business consultant and free-lance writer specializing in emerging technologies and human resources.

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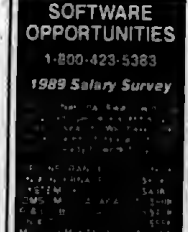
1989 Salary Survey



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Moore Financial Group, Inc., offers excellent salaries, benefits and career growth potential. For consideration, please submit resume, in confidence, to Mary Ockerse, Human Resource Specialist, Employee Relations & Staffing, P.O. Box 8247, Boise, ID 83733. An equal opportunity employer. Principals only, please.

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Keith Stone
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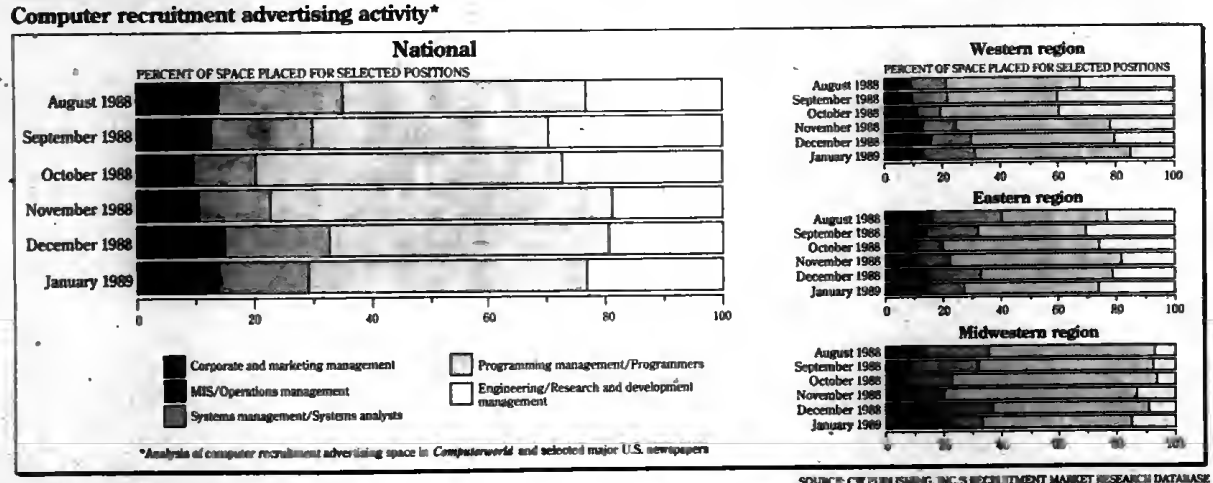
CAREER INDEX

Computer recruitment advertising activity*



*Analysis of computer recruitment advertising space in *Computerworld* and selected major U.S. newspapers

SOURCE: CW PUBLISHING, INC.'S RECRUITMENT MARKET RESEARCH DATABASE
CW CHART: FRANK C. O'CONNELL

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michcon

Data Processing

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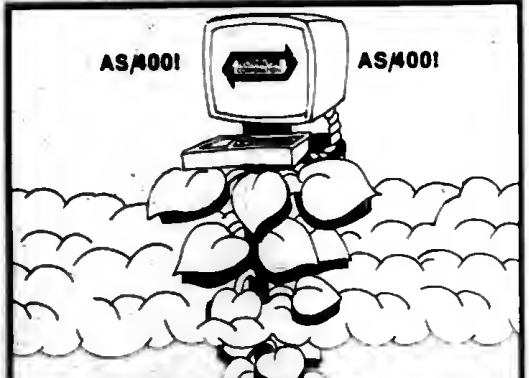

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IBM 4245 printer values rise

Low supply of Model 20s in the used marketplace causes price increase

BY NANCY DIPALMA
IDC FINANCIAL SERVICES CORP.

Values for the IBM 4245 Model 20 band printer continue to increase on the secondary market.

Used most commonly for printing six-part forms, this printer was trading at 60% of the retail price, or $22,500 in September 1988. Currently, the Model 20 is trading at $25,125, which is 67% of retail. Reports from players in the secondary market indicate that the higher values occurred because of tight supply. However, market sources indicate that used prices should stabilize at their current levels until more 4245 Model 20s become available.

A replacement for the Model 20 is expected to be available during the second or third quarter of this year. The replacement, most likely a 6262, will be able to print from 2,000 to 5,000 line/min as compared with the 4245 Model 20, which has a speed of 2,000 line/min. This announcement will cause the supply of 4245 Model 20s to loosen up, and the values to decline.

The 4245 Models D12 and D20 have begun to appear sporadically on the secondary market. These printers provide coaxial attachment to the 3174 and 3274 control units, the 9370 workstation controller and the 4361 processor workstation adapter.

Market research firm International Data Corp. (IDC), in Framingham, Mass., is currently unable to report a consistent fair market value for these models due to limited trading. However, the firm expects the printers to trade in relationship with the 4245 Models 12 and 20, once an established secondary market is developed.

Not so hot 4248 values

The 4248 band printer Models 1 and 2 have continued to decline on the used market since few users are interested in the high-end impact printers. Data centers that need printers in the speed range of the 4248 printers (3,000 line/min to 4,000 line/min), have chosen to install two 4245s or turned to alternative vendors such as Storage Technology Corp.

Users who did not take advantage of IBM's special offer to upgrade their 3800 Model 1 laser printer to a Model 3 last spring are now finding it difficult to locate a buyer who will take the Model 1 off their hands. With the current cost of upgrading at $95,000, it is no longer economically feasible for customers, since the upgraded Model 3 is currently trading for $90,000 on the used marketplace.

IBM's 4224 serial dot matrix printers have been very popular. However, they are only appearing in limited quantity on the secondary market despite strong shipments lately. IDC was able to obtain used values for the Models 201 and 202 that have a retail current fair market value of 84% and 80% respectively.

On Feb. 21, IBM announced a new System 370 attachable version of the 4234 dot band printer. The 4234 Model 11 attaches coaxially to the 3174 and 3274 control units; 4321, 4331 and 4361 display printer adapters; 4361 workstation adapter and the 9370 workstation controller. The new model 4234 offers print speeds of 800 line/min draft mode, 600 line/min data processing mode and 200 line/min near-letter quality.

One of the most important aspects of the System 370 announcement is the support of Intelligent Printer Data Stream, which was not supported on the 4234 Model 1. This feature offers enhanced word processing and graphics capabilities along with bar codes, raster images, vector graphics and overlays.

For more information, contact IDC Financial Services Corp.'a Terri LeBlanc at 508-872-8200.

IBM System 370 printers

Current fair market value

Model	IBM list price	Retail used market value	Retail percent of list price
3800-1	$215,000	$8,600	4%
3800-3	$270,000	$90,000	33%
3800-3	$270,000	$105,300	39%
4245-12	$32,550	$17,903	55%
4245-20	$37,500	$25,125	67%
4248-2	$78,750	$23,625	30%

SOURCE: IDC FINANCIAL SERVICES CORP.
CW CHART

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The BoCoEx index on used computers

Closing prices report for the week ending March 17, 1989

	Closing price	Recent high	Recent low
IBM PC Model 076	$700	$750	$350
XT Model 086	$1,050	$1,150	$900
XT Model 089	$1,200	$1,575	$1,000
AT Model 099	$1,725	$2,000	$1,525
AT Model 239	$1,850	$2,100	$1,800
AT Model 339	$2,100	$2,375	$1,800
PS/2 Model 30	$1,375	$1,550	$1,000
PS/2 Model 50	$2,200	$2,400	$1,900
Compaq Portable I	$625	$750	$550
Portable II	$1,900	$2,100	$1,750
Portable III	$2,800	$2,950	$2,500
Portable 286	$1,800	$1,975	$1,675
Plus	$1,050	$1,250	$900
Deskpro 286	$2,100	$2,350	$1,800
Deskpro 386	$3,750	$3,975	$3,675
Apple Macintosh 512	$625	$775	$550
512E	$775	$975	$600
Plus	$1,125	$1,225	$1,000
II	$3,925	$4,450	$3,425
Toshiba T3200	$2,950	$3,000	$2,500
Zenith 183	$1,400	$1,500	$1,000

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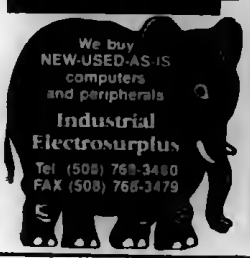

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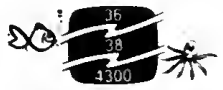

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2. To assist the MTA to gain an insight and understanding of Expert System s technology

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FOR: Research and Development of Expert Systems Technology

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3. INELIGIBLE BIDDERS: All bidders will be required to certify that they are not on the Comptroller General's list of ineligible contractors.

4. DISADVANTAGED BUSINESS ENTERPRISES: The Metropolitan Transportation Authority hereby notifies all bidders that it will affirmatively insure that in regard to any contract entered into pursuant to this advertisement, Disadvantaged Business Enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, sex, or national origin in consideration for an award.

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Sealed proposals will be received by the CDPA, 301 N. Lamar St., 301 Building, Suite 508, Jackson, MS 39201 for the following equipment and services.

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Request for Proposal No. 1626, due Monday, April 10, 1989 at 3:30 p.m. for the acquisition of calendaring, board appointment and correspondence tracking software for the STATE OF MISSISSIPPI GOVERNOR'S OFFICE.

Request for Proposal No. 1627, due Tuesday, April 11, 1989 at 3:30 p.m. for the acquisition of scanning equipment for various community colleges in the State of Mississippi.

Request for Proposal No. 1628, due Thursday, April 20, 1989 at 3:30 p.m. for the acquisition of a turnkey pharmacy system and software for the Pharmacy at ELLISVILLE STATE SCHOOL.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

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Proposals will be received by Antonio Tumgaro, Director, Human Resources Administration/Office of Purchasing and Materials Management, 30 Main Street, 5th Floor, Brooklyn, N.Y., 11201 until 5 P.M., April 28, 1989.

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A do-it-yourself education

IS professionals can manage change with a proactive approach to training

BY STEWART L. STOKES JR.
SPECIAL TO CW

Some systems professionals worry about their self-development, feeling the need to become more proactive in the pursuit of continuing education. I suggest they adopt self-directed learning as a permanent personal development strategy.

Self-directed learning can work for all levels of systems personnel. But for upper level managers, it is the key survival strategy.

Self-directed learners enter into the education process with more motivation and purpose and exit with greater ability to apply information and insights than their more dependent, reactive colleagues.

Combating change

This approach is more important than ever before. Why? — because of the volume and speed of change affecting the information systems professional. These changes stem from forces as diverse as the explosion of end-user computing and the flow of power, influence and resources toward the customer community. IS professionals are no longer only changing others; they are now being changed by others, and the implication is "develop or die." Proactive, self-directed learning offers the best solution to this situation.

To determine the competencies you need and the resources available to you in planning your own self-directed learning, ask yourself these questions:

- In what ways are your organization's information systems activities changing?
- In what way is your job changing?
- What skills and knowledge will you most need during the coming two years — a realistic planning horizon in today's business climate?
- What important longer term trends do you see developing that will affect IS, your organization and your career?
- What sources of learning and professional development — inside as well as outside the company — will help you meet the challenges you foresee and further your career?

The following example shows how each of these questions pertains to one company:

The enterprise decentralized into strategic business units with individual profit-and-loss accountability. This reorganization included the corporate information systems organization. No longer did the business units need to use corporate IS as their source of systems services. They were free to go wherever they chose. Corporate IS was no longer a monopoly and had to compete with outside sources for business.

> IS PROFESSIONALS are no longer only changing others; they are now being changed by others, and the implication is "develop or die."

Because corporate IS had to compete, everyone within the department had to become marketeers. This development required changes in roles, attitudes and behaviors. New skills had to be learned and the stress of changing roles overcome.

Systems managers had to take the lead in learning not only about the corporate vision, mission and objectives but also about the missions, objectives, businesses, customers and products of each strategic business unit. They also had to learn about internal marketing, market segmentation, target marketing and how to develop a marketing plan for each unit. Finally, they had to learn how to introduce, manage and cope with change.

Three longer term trends were very evident and very threatening. First, employees were to be evaluated more on their business savvy and managerial skills and less on their technical expertise.

Second, the power and influence they had enjoyed as gatekeepers of technology had ebbed and now flowed in the direction of their customers.

Third, the IS professionals were now — and would be in the future — responsible for their own career enhancement and professional development. They would have to find mentors, build coalitions and grow on their own.

Reading material

One internal resource for addressing these challenges was published corporate information. This material included financial statements, annual reports, product descriptions, market research reports and customer demographics.

IS professionals also established relationships with key line managers and began to learn about the various power structures and politics of the strategic business units. Similarly, they assimilated and spoke the language of their customers more so than the "technospeak" of IS.

These questions can help you down the road of self-directed learning. They can help you look at problems and issues and take the initiative in addressing them rather than focusing on the present and waiting for someone else to suggest the way.

Stokes is a senior vice-president of QED Information Sciences, Inc. in Wellesley, Mass.

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April 3 -	DP Training Organizations & the Public School Market
April 10 -	Developing an Automated Management System
April 17 -	Evaluating Training Vendors
April 24 -	Preparing the RFP for Training Services

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Apr. 10	Innovative Connections	PC's & Compatibles
Apr. 17	Business Executives Assess MIS	
Apr. 24	Managing after a Merger	
May 1		Network Management Tools
May 8	Automating the Data Center	
May 15		Manufacturing Technology

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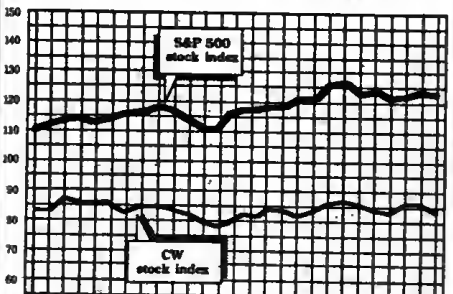
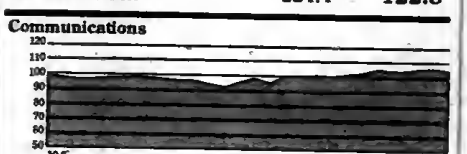
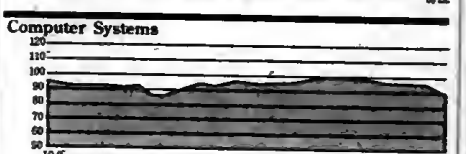
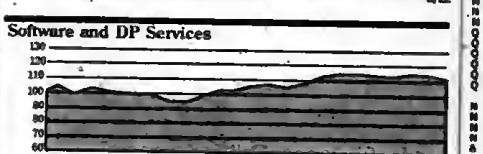
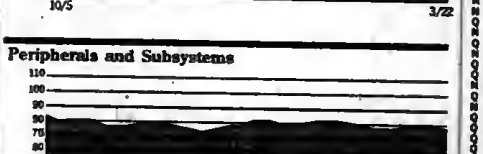


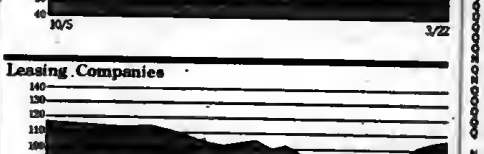
Indexes	Last Week	This Week
Communications	106.7	104.3
Computer Systems	94.6	89.8
Software & DP Services	113.9	110.4
Semiconductors	54.1	52.3
Peripherals & Subsystems	79.0	77.5
Leasing Companies	104.0	106.2
Composite Index	85.4	83.5
S&P 500 Index	124.4	122.8











Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MARCH 22, 1989

		PRICE 52-WEEK RANGE (1)	CLOSE MARCH 22, 1989	WEEK NET CHANGE	WEEK PCT CHANGE
Communications and Network Services					
N	AMERICAN INFO TECHS CORP	53 42	51.75	0.0	1.5
Q	ANDREW CORP	22 13	16.75	-0.5	-2.5
Q	ARTEL COMM CORP	4 1	2.875	-0.1	-2.1
N	AT&T	35 34	31.5	-1.1	-3.4
Q	AVANT GARDE COMP INC	3 0	0.625	0.1	25.0
N	AVANTEK INC	6 4	5	-0.5	-8.1
N	AYDIN CORP	17 12	16.0	-0.1	-0.6
N	BELL ATLANTIC CORP	76 64	71.25	0.6	1.0
N	BELLSOUTH CORP	44 37	41.625	-0.3	-0.6
Q	COMPRESSION LABS INC	6 3	4.75	0.3	6.6
N	COMPUTER NETWORK TECH	2 1	1.563	0.0	-1.5
Q	CONTEL CORP	61 61	49.25	-0.8	-1.5
Q	DATA SWITCH CORP	6 5	6	-0.5	-8.1
Q	DIGITAL COMM ASSOC	28 17	18.75	-4.1	-18.0
Q	DYNATECH CORP	24 17	18.25	-0.3	-1.9
Q	FIBRONICS INTERNATIONAL INC				
Q	GANDALF TECHNOLOGIES	6 3	4.25	-0.5	-12.8
Q	GENERAL DATACOMM INDS	6 3	5.375	-0.5	-10.3
N	GTE CORP	48 34	40	-1.8	-4.4
Q	INFOTRON SYS CORP	14 6	6.9	-0.5	-6.8
N	ITT CORP	58 44	51	-2.5	-4.7
N	M A COM INC	11 7	7.625	-0.5	-6.7
Q	MCI COMMUNICATIONS CORP	48 11	36.375	-0.6	-1.6
Q	NETWORK EQUIPMENT TECH INC				
Q	NETWORK SYS CORP	22 14	16.75	-2.4	-10.7
N	NORTHERN TELECOM LTD	20 16	18.125	-0.1	-11.0
Q	NOVELL INC	28 16	21.25	-1.5	-4.6
N	NYNEX CORP	71 61	70	-0.4	-0.5
N	PACIFIC TELESIS GROUP	38 27	34.625	-0.8	-1.4
N	PARADYNE CORP	10 4	10.25	0.0	0.0
A	PENRIL CORP	6 4	4.5	0.0	0.0
N	PLESSEY PLC	46 25	43.5	-1.5	-2.5
N	SCIENTIFIC ATLANTA INC	16 10	14.375	-0.6	-2.5
N	SOUTHWESTERN BELL CORP	46 34	44.375	-0.9	-1.9
Q	SCOM CORP	28 16	25.125	-0.6	-2.4
N	US WEST INC	63 50	61	-1.9	-2.2
Computer Systems					
Q	ALLIANT COMPUTER SYS	6 2	3.375	0.0	0.0
Q	ALPHA MICROSYSTEMS	6 4	7	0.0	0.0
Q	ALTOS COMPUTER SYS	11 6	8.125	-1.1	-10.6
A	AMDAHL CORP	28 16	16.75	-0.8	-4.3
Q	APOLLO COMPUTER INC	17 7	7.875	-0.4	-4.9
Q	APPLE COMPUTER INC	49 34	33.75	-1.5	-3.6
N	BOLT BERANEK & NEWMAN	16 9	9.125	-0.4	-3.9
Q	BRITTON LEE INC	4 2	2.875	0.3	9.9
N	COMPAQ COMPUTER CORP	75 47	69.125	-2.5	-4.0
Q	COMPUTER AUTOMATION INC	14 3	4.625	-0.4	-7.5
Q	CONCURRENT COMP CORP	6 4	6	0.0	0.0
Q	CONTROL DATA CORP	28 16	20.375	-1.4	-6.5
Q	CONVEX COMPUTER CORP	11 7	9.0	-1.1	-10.9
N	CRAY RESH INC	89 53	55.75	-4.4	-7.3
Q	DAISY SYS CORP	12 4	4.125	-0.8	-15.4
Q	DATA GEN CORP	25 16	15.125	-2.1	-12.3
N	DATAPOINT CORP	6 4	3.75	0.0	0.0
Q	DELL COMPUTER CORP	12 7	6.875	-0.3	-2.5
N	DIGITAL EQUIP CORP	122 78	86.375	-16.9	-14.0
Q	FLOATING POINT SYS INC	6 2	2.75	-0.1	-4.8
N	HARRIS CORP	33 25	27.875	0.0	0.0
N	HEWLETT PACKARD CO	35 44	52	-2.5	-4.1
N	HONEYWELL INC	77 57	64.375	1.5	1.8
N	IBM	127 104	109.25	-7.5	-6.5
Q	INFORMATION INTL INC	16 12	15.375	0.4	2.5
Q	IPL SYS INC	7 1	8.125	0.0	0.0
N	MAI BASIC FOUR INC	21 7	9	-0.8	-8.0
Q	MATSUSHITA ELEC IND LTD	230 126	187	-2.5	-1.4
Q	MEGADATA CORP	4 1	1.813	-0.1	-8.7
Q	MENTOR GRAPHICS CORP	37 23	30.75	-1.5	-2.5
N	NBI INC	7 1	1.8	-0.1	-7.7
N	NCR CORP	70 53	54	-2.5	-4.4
N	PRIME COMPUTER INC	21 12	16.875	-1.1	-6.3
Q	PYRAMID TECHNOLOGY	20 10	18.25	-5.5	-28.4
Q	SILICON GRAPHICS CORP	26 14	19.25	0.0	0.0
Q	STRATUS COMPUTER	32 21	25.25	-2.5	-9.0
Q	SUN MICROSYSTEM INC	21 16	16.375	-0.1	-0.6
Q	SYMBOLICS INC	2 1	1.938	-0.1	-3.1
Q	SEQUENT COMPUTER SYS INC	27 14	23.125	-2.5	-10.2
N	TANDEM COMPUTERS INC	21 12	17.75	-1.5	-8.6
N	TANDY CORP	49 38	42.375	-1.3	-2.9
N	ULTIMATE CORP	15 9	8.875	-0.4	-3.7
N	UNISYS CORP	38 25	28.75	-2.5	-7.2
A	WANG LABS INC	16 9	8.375	-1.8	-10.7
Software & DP Services					
Q	ADVANCED COMP TECH	4 1	3.25	-0.5	-7.1
Q	AMERICAN MGMT SYS INC	19 12	15.125	-1.4	-8.3
Q	AMERICAN SOFTWARE INC	21 12	19.25	-0.8	-4.3
N	AMACOMP INC	12 6	6	-0.8	-11.1
Q	ANALYSTS INTL CORP	16 7	10.75	0.6	6.1
Q	ASHTON TATE	30 16	19.5	-0.5	-2.5
Q	ASK COMPUTER SYS INC	15 12	14.5	-1.5	-9.8
Q	AUTODESK INC	34 22	27.5	-2.5	-8.3
Q	AUTO DATA PROCESSING	45 35	36.125	-0.4	-1.0
Q	BMC SOFTWARE INC	17 6	16.250	-0.6	-3.1
N	BOLE & BABBAGE INC	16 6	15	-0.3	-1.8
R	BUSINESSLAND INC	16 6	10.75	-1.0	-8.5
N	COMPUTER ASSOC INTL INC	40 34	35	-2.5	-6.7
Q	COMPUTER HORIZONS CORP	12 7	8.25	0.1	1.5
N	COMPUTER SCIENCES CORP	38 28	48	-0.8	-1.5
Q	CORPORATE SOFTWARE	15 6	6	-1.3	-12.2
N	COMPUTER TASK GROUP INC	17 10	15.375	1.1	7.5
Q	COSMOS INC	6 6	6.875	-0.1	-1.5
Q	COMSHARE INC	29 16	25	-2.5	-8.9
N	CULLINET SOFTWARE INC	6 4	5.125	-0.3	-4.7
Q	DUQUESNE SYS INC	24 16	22.5	0.0	0.0
N	GENERAL INTRS (CLS E)	47 37	43	-0.5	-0.8
Q	KODAK SYS INC	9 7	4.625	-0.5	-9.1
Q	INFORMIX CORP	25 7	11	0.0	0.0
Q	INTELLICORP INC	4 6	3.75	0.0	0.0
Q	KEANE INC	28 6	28	1.5	6.7
Q	LOTUS DEV CORP	27 15	20.75	-1.5	-6.7
Q	MANAGEMENT SCI AMER	16 6	8.75	0.3	2.9
Q	MICRO PRO INTL CORP	4 2	1.938	0.0	0.0
Q	MICROSOFT CORP	71 45	49	-1.3	-2.5
Q	MORINO ASSOCIATES INC	20 12	20	0.0	0.0
N	NATIONAL DATA CORP	31 16	27	0.8	2.9
N	ON LINE SOFTWARE INTL INC	14 4	5.625	0.1	2.3
Q	ORACLE SYS CORP	28 16	22.25	-2.5	-8.3
Q	RANSOMPC SYS INC	15 12	13.25	-0.1	-0.8
Q	PHOENIX TECHNOLOGIES INC	16 12	15.75	-1.5	-8.7
Q	POLICY MGMT SYS CORP	27 21	22.25	-1.0	-4.3
Q	PROGRAMMING & SYS INC	16 10	17	-0.5	-1.4
Q	RABBIT SOFTWARE INC	6 2	1.875	-0.6	-16.7
Q	RELATIONAL TECHNOLOGY INC				
N	REYNOLDS & REYNOLDS CO	21 15	13.375	-1.5	-8.6
Q	SEI CORP	25 17	26	-2.0	-7.1
Q	SHARED MED SYS CORP	22 16	16.75	0.8	4.7
Q	SAGE SOFTWARE INC	20 14	16.125	-0.1	-0.7
Q	SOFTWARE PUBG CORP	10 6	6.875	0.4	4.4
Q	STERLING SOFTWARE INC	27 15	16.625	0.9	5.1
Q	SUNGARD DATA SYS INC	6 6	5.625	-0.8	-11.8
Q	SYSTEMATICS INC	20 14	13.75	-1.5	-9.8
N	SYSTEM CENTER INC	28 22	24.25	0.5	2.2
N	SYSL SOFT INC	21 15	20.25	-0.1	-0.6
N	SYSL SOFT INC	28 6	18.25	-1.3	-6.1
Semiconductors					
N	ADV MICRO DEVICES INC	17 7	8	-0.9	-4.8
N	ANALOG DEVICES INC	20 10	10.5	-0.1	-1.5
Q	ANALOGIC CORP	16 6	8.125	-0.3	-3.7
Q	CHIPS & TECHNOLOGIES INC	21 11	18.75	-1.5	-7.4
Q	INTEL CORP	37 16	23.375	-1.5	-6.5
Q	LSI LOGIC CORP	14 6	11.875	-0.8	-7.1
Q	MICRON TECHNOLOGY INC	25 16	17.625	-0.5	-2.8
N	MOTOROLA INC	38 26	36.875	-1.4	-3.3
N	NATL SEMICONDUCTOR	16 8	7.625	-0.6	-8.5
N	TEXAS INSTRS INC	29 25	27.5	-0.8	-2.5
A	WESTERN DIGITAL CORP	17 11	11.375	0.0	0.0
Peripherals					
Q	ALLOY COMP	6 2	2.25	-0.1	-5.8
N	AMI INTL INC	6 3	5.75	0.0	0.0
Q	AST RESH INC	17 7	6.875	-0.9	-3.5
Q	AUTO TROL TECH CORP	6 6	8.125	0.1	2.5
Q	BANCTEC INC	12 6	10.625	-1.0	-8.6
Q	CIPHER DATA PRODS INC	11 6	8.25	-0.8	-8.3
A	COGNITRONICS CORP	5 5	4	-0.5	-11.1
Q	CONNER PERIPHERALS	16 7	6.875	-0.6	-8.3
A	DATAPRODUCTS CORP	16 6	16.75	0.3	1.8
A	DATARAM CORP	9 6	6.125	-0.5	-8.0
N	EASTMAN KODAK CO	50 38	49.25	-1.0	-4.8
Q	E M C CORP MASS	16 4	4	-0.5	-5.9
Q	EMULEX CORP	12 6	6.875	-0.3	-2.5
Q	EVANS & SUTHERLAND	21 13	15.0	-1.5	-9.7
Q	EXOT CORP	6 2	2.75	0.3	10.9
Q	INTERLEAF INC	20 6	8.125	-0.8	-8.5
Q	IOMEGA CORP	6 6	1.938	-0.1	-3.1
Q	LEE DATA CORP	4 2	2.0	0.0	0.0
Q	MASSTOR SYS CORP	4 2	2.375	0.0	0.0
Q	MAXTOR CORP	16 6	6	-0.6	-4.8
Q	MICROPOLIS CORP	27 6	8.25	-0.1	-2.0
N	MINISCRIBE CORP	14 6	3.844	1.0	33.7
N	MINNESOTA MNG & MFG CO	70 57	67.875	-0.6	-0.8
Q	PERSONAL COMPUTER PRODUCTS INC	7 4	4.5	0.4	9.1
Q	PRIAM CORP	2 1	0.938	-0.1	-9.9
Q	PRINTRONIX INC	11 7	8.75	-0.5	-5.9
R	QMS INC	12 6	8.375	-0.5	-5.6
Q	QUANTUM CORP	17 10	16.75	0.3	1.8
Q	RECOGNITION EQUIP INC	16 6	9.625	-0.5	-5.1
Q	REXON INC	6 6	6.875	-0.5	-6.8
Q	SEAGATE TECHNOLOGY	23 7	10.5	0.8	7.7
N	STORAGE TECH CORP	4 1	2.125	0.0	0.0
Q	TANDON CORP	6 2	1.063	-0.1	-10.5
N	TEKTRONIX INC	20 10	21.25	-1.1	-5.0
Q	TELEVIDEO SYS INC	1 0	0.344	0.0	-8.5
N	XEROX CORP	67 30	59.75	-1.5	-2.4
Leasing Companies					
Q	AMPLICON INC	20 13	18.25	-0.6	-3.9
N	CAPITAL ASSOCIATES INTER-NATIONAL INC	6 4	8.25	-0.4	-4.3
N	COMDISCO INC	26 16	21.75	-1.1	-4.8
Q	CONTINENTAL INFO SYS	6 0	0.859	0.1	10.1
Q	LDI CORPORATION	17 10	16.5	1.3	8.2
Q	PHOENIX AMERN INC	6 6	3.375	0.1	3.8
Q	SELECTERM INC	7 4	7	0.0	0.0

EXCH: N—NEW YORK; A—AMERICAN; Q—NATIONAL

Roaring out

After coming in like a lion, March still rough on investors

It's not nice to fool Mother Nature or to disappoint Wall Street. But IBM and Digital Equipment Corp., which have both traveled this path previously, took a bath on the New York Stock Exchange after warning analysts that profit expectations were too high.

IBM dropped its bombshell late on Friday, March 17, which — combined with the inflation scare of that day — shaved a cool 6 points off the previous day's closing of 117. The dip continued Monday, and despite a slight easing later in the week, IBM closed out Thursday afternoon at 109¾, down 6% from the previous week.

DEC quietly let it be known — in other words, made no official announcement — that revenue for the quarter would be off, primarily due to weak domestic sales. Wall Street chopped 10 points off the stock Wednesday as word went out, and DEC closed Thursday at 97⅛, down a stunning 15 points from a week earlier.

Meanwhile, dueling press releases from Apple and Microsoft in the wake of a recent preliminary decision in their battle over Windows left investors biding their time. Microsoft closed out Thursday unchanged from the week before, while Apple was slightly up.

Extended Edition upgrade planned

BY WILLIAM BRANDEL
CW STAFF

IBM will enhance OS/2 Extended Edition later this spring with Version 1.2, which will feature an enhanced database management system component with direct support for Presentation Manager and local-area networks, according to sources briefed by IBM.

IBM sources confirmed last week that OS/2 Extended 1.2, which is expected to ship this summer, will provide direct support for Presentation Manager-based queries. Decision-support aspects such as porting query and report writer components will be processed by a server running OS/2 Extended with a DB2-like database manager, said John Dunkle, vice-president of Workgroup Technologies in Hampton, N.H.

These decision-support mechanisms will allow the user to perform data analysis on the graphics portion of the Presentation Manager, he explained.

Dunkle said that queries to the OS/2 Extended 1.2 database in its initial form will be made through a command line prompt. IBM intends to release a version of the product by mid-1990 that allows icon manipulation as well as query formulation through icon programming, Dunkle added.

Key SAA role

The enhancements to OS/2 Extended are expected to play a key role in IBM's forthcoming Systems Application Architecture (SAA) Office product. In February, Earl Wheeler, the IBM vice-president who is shepherding the SAA effort, described SAA Office as the first integrated SAA product.

Wheeler added that the environment will include document preparation, electronic mail, decision-support features and an iconic interface.

> IBM INTENDS to release a version of the product by mid-1990 that allows icon manipulation and query formulation through icon programming.

IBM said that it will first implement SAA Office on a personal computer-resident product that will support LANs, according to Ann Talermo, director of integrated systems at International Data Corp., a Framingham, Mass.-based market research firm.

Talermo and other analysts said they are expecting IBM to unveil the SAA Office architecture in a formal announcement sometime this spring. Sources said they expect several compatible versions of SAA Office that will run on various software platforms such as IBM's MVS and OS/400 operating systems.

Senior Editor Douglas Barney contributed to this report.

Akers speaks to Wall Street fears

BY NELL MARGOLIS
CW STAFF

BOSTON — IBM Chairman John Akers conceded last week that IBM is now facing a global market in which the old rules are thrown out and the new are as yet unknown. Specific economic forecasting, he said, would be futile.

Akers highlighted a daylong IBM briefing for securities analysts here that occurred less than a week after the company stunned Wall Street by announcing that profit expectations for its current quarter were not likely to be met.

Stressing past investments in a multitude of new products now in the commercial stream and last year's massive restructuring efforts, which decentralized IBM to a great extent, Akers appeared to discount any fears that the computer industry faces a severe problem.

"If we can be the best at satisfying the needs and wants of customers in those markets we choose to serve, everything else important will follow," Akers said.

Akers stressed *product investments, restructuring to explain off profits*

Carl Conti, senior vice-president and general manager of Enterprise Systems, said IBM expects "continuing demand for large systems."

IBM attributed its imminent disappointing results to a chip-yield problem that affected certain mainframe deliveries. The fundamental fear on Wall Street "was that there was more to this than met the eye, that there was a deeper problem with demand that we were not hearing about," said Marc Schulman, an analyst at UBS Securities, Inc. "I think they said as explicitly as a company can say that this isn't the case."

Despite Akers' assurance that "this is a growth industry; we're a growth business," speakers skirted the issue of how soon IBM would be able to beat or even meet the 10% estimated near-term industry growth rate.

What delay?

FROM PAGE 1

The spokesman said IBM is working with individual customers to resolve the problems brought on by S model delays, and the company is lending mainframes and offering programming assistance to those who need it.

Also, he said, the delays will primarily hit customers requesting upgrades because if a customer already had a 3090, he may be asked to hold on for a few more months.

However, one customer whose delivery was moved up by IBM had an upgrade on order. The IBM spokesman said it came down to an issue of matching the components available to the 3090 S model demand. While one customer needing a Model 300S upgrade may have to wait a few more months, another customer waiting for a 170S upgrade could be accommodated immediately.

Based on interviews with users, it appears that IBM is handling customers on a case-by-case basis.

One Midwest insurance company was expecting delivery of a 3090 Model 300S upgrade in January and was told at the end of 1988 that the machine would not be available until May. The company, however, could not wait that long to give its Model 200E a power boost, according to the director of computer services. It agreed to install a Model 300E in the meantime. Recently, the insurance company was informed that the Model 300S would not arrive until September.

Another user said he requested that a 3090 S model be delivered by the second quarter but was told by IBM that he could not be accommodated. He declined to comment further.

Get what you want

At Engelhard Corp. in Iselin, N.J., the MIS department had planned to upgrade a 3090 Model 150 to a Model 170S in April. Recently, the department decided it wanted the new system immediately. "We needed it earlier, and it was moved up," said Steven Pook, director of information services.

A machinery manufacturer in California said he had been expecting delivery of a 3090 Model 120S in April. IBM moved that shipment date up to last week, which actually put the MIS department in a bind, according to the MIS director, because the department was just completing a redesign of the data center.

A 3090 Model 600S upgrade is tentatively scheduled to arrive in June at the Airline Tariff Publishing Co. in Washington, D.C. According to Michael Ferrier, a senior vice-president at the company, the ship date remains firm, and he has not decided to take the machine at that time.

"They have not approached me at all with questions on a delay," he said. "All their questions are, 'Are you going to take it?' "

Staff writer James Daly contributed to this report.

DEC lowers its outlook, downplays reaction

BY JAMES DALY
CW STAFF

MAYNARD, Mass. — Although the rumor has circled the industry for nearly a month, when Digital Equipment Corp. finally dropped its bomb last week and confirmed to financial analysts that its third-quarter revenue would be lower than many anticipated, the shell scored a direct hit on Wall Street.

Prices on DEC issues plummeted $10.63 per share Wednesday afternoon as panicky investors looked to rid themselves quickly of their interests in the minicomputer maker.

Weak domestic sales were blamed for the shortfall, with some analysts scaling back third-quarter revenue predictions by as much as $100 million to an estimated $3.1 billion. Net income growth-rate forecasts for the quarter ending April 1 slipped to 10%, or approximately $308 million, down from an average of 13%, or an estimated $316 million.

DEC officials, however, downplayed the importance of the indications. "This is not big news," said Mark Steinkrauss, director of investor relations at DEC. "We've spoken to several analysts that had high numbers and told them we felt they were more optimistic than what the company feels is appropriate."

While most observers agree there is nothing fundamentally wrong at DEC, a nagging problem remains — the firm is shifting and grinding gears simultaneously. DEC has tried to rise like a phoenix out of the ashes of a sluggish minicomputer market with an aggressive and expansive product introduction schedule; dozens of hardware and software offerings have been announced since early January.

But the move has backfired in some areas, with some potential buyers keeping their hands in their pockets and out of their wallets until the new products are released. "High-end buyers are waiting for the introduction of [high-end uniprocessor] Aridus later this year, and new Microvaxes are coming out in a few weeks, so fewer people are buying the 3500 and 3600," said Terry Shannon, director of Framingham, Mass., market research firm International Data Corp.'s DEC Advisory Service.

Many of the desktop offerings are also more of a strategic move than a bid for financial return. With the exception of the midrange VAX 6300, the new machines offer very low margins.

"They're not trying to make money as much as they're attempting to stem the outflow of their installed base to firms like Apollo and Hewlett-Packard," said Robert Cameron, a senior industry analyst at market research firm Dataquest, Inc. "But those are strategic investments they'll need for the long-term payback."

Although rumors continue to surface that DEC's recent financial troubles may force it to cut back its work force, Steinkrauss denied such talk. "We'll look at all our alternatives, but [layoffs] are not anticipated," he said.

In the past few weeks, investors have seen revised earnings projections from a pack of technology-related stocks, including IBM, Apple Computer, Inc., Unisys Corp., Intel Corp., Prime Computer, Inc. and Pyramid Technology Corp.

Laser recorder to aid CD-ROM

BY PATRICK WAURZYNIAK
CW STAFF

Practical information systems applications of compact disk/read-only memory (CD-ROM) moved a step closer to reality last week with the announcement of a recording system that will enable corporations to create media for distribution of large volumes of information.

Meridian Data, Inc., a privately held firm based in Capitola, Calif., introduced a CD-ROM publishing system called CD Professional that incorporates a compact laser recorder developed by Yamaha in Japan in cooperation with Philips Telecommunications N.V. in the Netherlands.

With the recording system, priced at $98,000 and scheduled to be available in May, users can create their own CD-ROM-based applications for internal use at large corporations without sending data on nine-track tape to an independent CD-ROM-mastering facility.

Howie York, manager of systems development at Nynex Information Resources, Inc., a Wakefield, Mass.-based subsidiary of Nynex Corp., said his development facility is looking at CD Professional for creating customized applications.

"We're going to evaluate it," said York, who uses Meridian's earlier CD Publisher premastering system for CD-ROM data preparation. "It looks like it has tremendous potential."

The system consists of Meridian's software and several hardware components integrated into two cabinets. Meridian is aiming the system at Fortune 1,000 firms that compile large amounts of data typically distributed on nine-track tape.

"The CD-ROM business has really been focused only on the commercial information industry," Meridian Data President Fred Meyer said. "We feel business needs to output and share media — that's what CD offers."

Claiming that CD will now be more cost-effective, Meyer said the technology is already being considered "as a replacement for the standard system updates for their mainframe operating systems software, which normally are distributed on nine-track tape."

York's development group at Nynex extracts information from its mainframe-based IBM DB2 database that is downloaded into the CD Publisher, Meridian's premastering system. That system produces a nine-track tape that is later pressed into CD-ROM disks at a remote CD-mastering facility.

"That's just cumbersome logistics with tape," York said. "If I can do it with a CD, that's much easier. I don't have to send six 6250 [nine-track] tapes off-site to be pressed into disks."

Meridian's introduction preceded Microsoft's fourth annual CD-ROM conference this week in Anaheim, Calif., at which several vendors, including Lotus Development Corp. and Apple Computer, Inc., are expected either to introduce or demonstrate CD applications.

An Apple spokeswoman would only say that Apple plans to affirm its commitment to CD-ROM while introducing a combination of existing and new CD-ROM applications for Apple's line of personal computers along with several third-party vendors.

At Lotus, a spokeswoman confirmed that the company plans to show a multimedia prototype to selected parties.

Novell gains Excelan, LAN Manager license

BY PATRICIA KEEFE
CW STAFF

PROVO, Utah — In an effort to accommodate the connectivity needs of MIS shops more easily, local-area network vendor Novell, Inc. last week agreed to acquire Excelan, Inc., a supplier of key protocol standards, in a stock swap valued at roughly $170 million.

In order to play in the enterprise network market, LAN vendors are scrambling to provide support for multiple protocol stacks — such as Transmission Control Protocol/Internet Protocol (TCP/IP) and Open Systems Interconnect (OSI) — under their network software.

This has been a glaring weakness at Novell. San Jose, Calif.-based Excelan fills that void with its TCP/IP, OSI and Sun Microsystems, Inc. Network File System expertise. In particular, this would provide users and OEMs of Novell's Unix offering — Portable Netware — with richer capabilities more quickly.

The purchase, which is expected to be finalized in June, also features two ironic twists:

- It makes Novell a licensee, however indirectly, of Microsoft Corp.'s OS/2 LAN Manager, a rival technology. Excelan is a LAN Manager licensee.
- It drops Novell squarely back into a business it has paid dearly to leave — hardware. There is some speculation that Novell could spin off part or all of Excelan's board business.

Novell could exploit Excelan's LAN Manager support with corporate accounts uncertain about whether to back Netware or competitive LAN Manager-based systems such as 3Com Corp.'s 3+Open.

Also, the ability to support users' communications strategies, regardless of which way they lean, could seriously blunt 3Com's contention that Novell is nonstandard and closed out of the OS/2 server support.

3Com declined to comment at press time. Microsoft, however, is "tickled pink that Novell is now a LAN Manager licensee," according to Rob Glaser, Microsoft's director of LAN business.

Users will also gain a full suite of Apple Computer, Inc. Macintosh network products, thanks to the combination of Novell's Netware for Macintosh with Mac connectivity offerings from Excelan's Kinetics subsidiary.

Users still do Windows despite Microsoft suit

BY JULIE PITTA
CW STAFF

SAN FRANCISCO — Lawsuit or no lawsuit, users of Microsoft Corp.'s Windows last week said they will not be dissuaded from continuing to purchase that product.

This is despite a recent ruling interpreted by some as an early victory for Apple Computer, Inc. in its copyright infringement suit against Microsoft.

"The lawsuit is really of only passing interest to me," said Arthur Block, vice-president of end-user automation support at Manufacturers Hanover Trust Co. in New York. "If Microsoft loses, they'll have to pay Apple some money or modify Windows in some way. A modification might impact the price of the product, but I don't expect it will be much."

Manufacturers Hanover has 1,500 personal computers running Windows.

"It's not going to slow us down, because users want it," said Cheryl Currid, manager of applied information technology for Coca-Cola Foods in Houston. But, she added, "I don't think anyone in corporate America thought this was a serious lawsuit until last week."

Apple appears to have gained something of a Round 1 victory in what promises to be a lengthy courtroom drama.

At the first hearing in the case, held March 17, Microsoft asked that the case be dismissed on the grounds that it had used Apple's technology legally. However, U.S. District Judge William Schwarzer issued a preliminary ruling that a 1985 agreement between Apple and Microsoft does not apply to Windows Version 2.03, the follow-up product to the original Windows. In 1985, Apple licensed elements of its graphical user interface to Microsoft for a Macintosh version of Windows 1.0.

Following the preliminary ruling, Schwarzer issued a written statement declaring that the 1985 license is not "a complete defense" against Apple's charges of infringement. The addition of the word "complete" was made at the request of Microsoft attorneys.

As could be expected, both sides are declaring a victory, although Microsoft's celebration seems to be somewhat muted compared with Apple's. "The license is alive," said Bill Pope, senior corporate attorney for Microsoft. "Apple was attempting to knock the license out completely."

Apple officials are calling the ruling a first, resounding victory.

V-I-C-T-O-R-Y

At worst, a victory would mean that Apple could prevent Microsoft from selling Windows 2.03. Other products based on Windows 2.03 — such as New Wave from Hewlett-Packard Co., which is a co-defendant in the case, and IBM's Presentation Manager, which has not been cited to date — would be threatened as well.

Users don't seem too bothered. "When they make a final decision, then it's time to worry about how to react," said John Woomer, a systems specialist at Du Pont Co. in Newark, Del.

"I haven't been too worried about it," said Mary Howlett, manager of office automation systems at Hughes Aircraft Co.'s Ground Systems Group in Fullerton, Calif. "These things tend to take a long time."

In the meantime, software companies that have developed products based on Windows 2.03 said they will continue to ship products and create new Windows applications. "It truly is unimportant," said George Grayson, president of Micrografx, Inc. in Richardson, Texas, developer of Windows applications Designer and Graph Plus. "The worst case is that we have to make alterations to our applications. Apple is not going to stop the migration of the graphic user interfaces to the IBM world."

Rod Zimmerman, manager of product marketing at Gupta Technologies, Inc. in Menlo Park, Calif., developer of SQL Windows, concurred. "The only case in which we would be impacted is if Microsoft was prevented from selling Windows or Presentation Manager," he said. "We don't expect that to happen."

Another meeting is scheduled in court for April 14.

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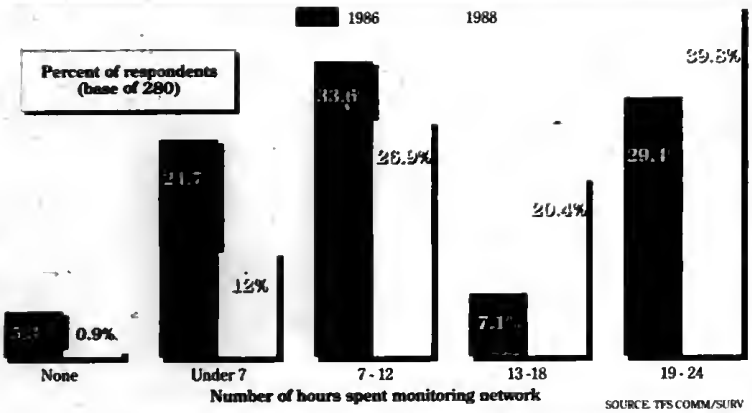
TRENDS

Network management

Network monitoring has become increasingly important



SOURCE: TFS COMM/SURV

Less than half of 280 large corporate sites recently surveyed have integrated network management, and some firms are actually backing away from bringing different types of networking equipment under the management system.

According to TFS Comm/Surv, the market information division of TFS, Inc. in Westford, Mass., IBM's Netview accounted for 57% of the sites with network management systems. Only 46% of those sampled had an "integrated network management facility," as opposed to simple monitoring tools often offered with telecommunications equipment, TFS Comm/Surv spokesman Barry Gilbert said. More than half of such sites use more than one formal network management system.

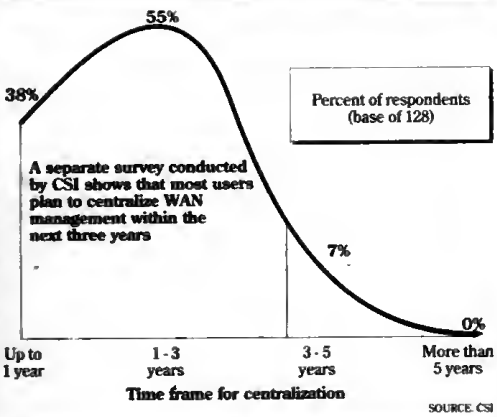
TFS Comm/Surv found that in the last 12 months, some firms had changed their minds about providing integrated management for different parts of their network — particularly in voice and data. Gilbert said, "Two years ago, they were saying, 'The more integration the better; we'll manage everything under one umbrella.' Now they're saying, 'Why upset the applecart if it works fine stand-alone?' "

There are two major reasons for this: information systems and telecommunications department budgetary crunches and the scarcity of useful voice and data applications. Only 29% of respondents said they had an integrated voice and data network.

Study participants were multisite organizations that spend an average of $3.5 million annually on communications.

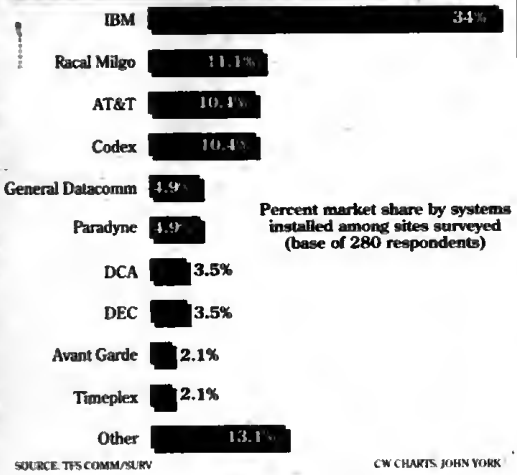
ELISABETH HORWITT

Users say implementation is critical



SOURCE: CSI

IBM leads a long line of competitors



SOURCE: TFS COMM/SURV

CW CHARTS: JOHN YORK

INSIDE LINES

Can't wait for Comdex. Some dealers are expecting IBM to make another addition to its line of Personal System/2s early next month. They expect an April 4 announcement of the PS/2 Model 55, based on Intel Corp.'s 386SX chip, running at 16 MHz and using Micro Channel. It will be packaged like the previously introduced Model 50.

Tut, tut, tut. Apparently hoping to generate enthusiasm for its Meridian Data Network System (DNS), which has received some bad press lately, Northern Telecom issued a release last week that made it sound like American Airlines plans to implement the product. But all American has agreed to buy is Northern's DPN line of packet-switching nodes. Meridian DNS is only one of several competing products American is considering, a spokeswoman for American said.

There's money somewhere. While DEC's domestic hardware sales slip, service revenue continues to be red-hot. And DEC is doing everything in its power to make sure that continues. Expect to see some major service-related moves in the next few months, including a desktop services program and an integrated services program that will bring AI-based predictive diagnosis and dedicated diagnostic processors to the DEC environment.

What Next? IBM PC chief James Cannavino stunned an early morning audience at the PC Forum conference in Palm Springs, Calif., when he admitted that IBM might never use the Next graphical interface it licensed for some $10 million. However, last week IBM was demonstrating the interface running on AIX to MIS pros in Orlando, Fla.

Back in the saddle again? Wilton Jones has led a fast life. He wrote a word processor, founded Multimate International, sold out to Ashton-Tate for $21 million and then sailed for 18 months. Lately, though, Jones has taken to writing code from his horse ranch and has made quite a bit of headway on an "object-oriented word processor for the Mac and OS/2 Presentation Manager." Jones figures about $20 million to $30 million in start-up costs will be enough to handle the launch. The only question is, who pays?

Under cover. Borland International has pretty much completed its Dbase clone but is not anxious to introduce it. The fear is twofold. Most dangerous is a copyright infringement lawsuit from litigation-happy Ashton-Tate. A lesser fear is that the clone would cut into sales of Borland's Paradox, which at $795 provides a nice margin.

Mini micro sales. How are things over at Wang Laboratories' Microsystems Division? Well, one way to measure success is to take a look at the direct-sales attrition rate, says one Wang watcher. He notes the industry's average annual attrition rate is about 11%. Wang's division, he claims, has three times that attrition rate. According to this source, putting Microsystems Division chief Robert Ano and Vice-President of Worldwide Marketing Kenneth Olisa in the same room is a guarantee that sparks will fly. Olisa and Ian Diery, Wang's executive vice-president of worldwide field operations, apparently believe that the Microsystems Division drains resources away from more profitable efforts.

Start me up. Users of 3Com's 3+Open reportedly can expect a performance boost when the vendor rolls out the next version of its OS/2 LAN Manager-based network operating system in late April or early May. Sources claim that OS/2 LAN Manager-based systems, of which 3+Open is one, are taking a beating on performance when compared with Novell's Netware Version 2.15. "There's been as much as a 20% to 40% difference in throughput recorded under some situations," said George Colony, an analyst at Forrester Research, Inc. in Cambridge, Mass.

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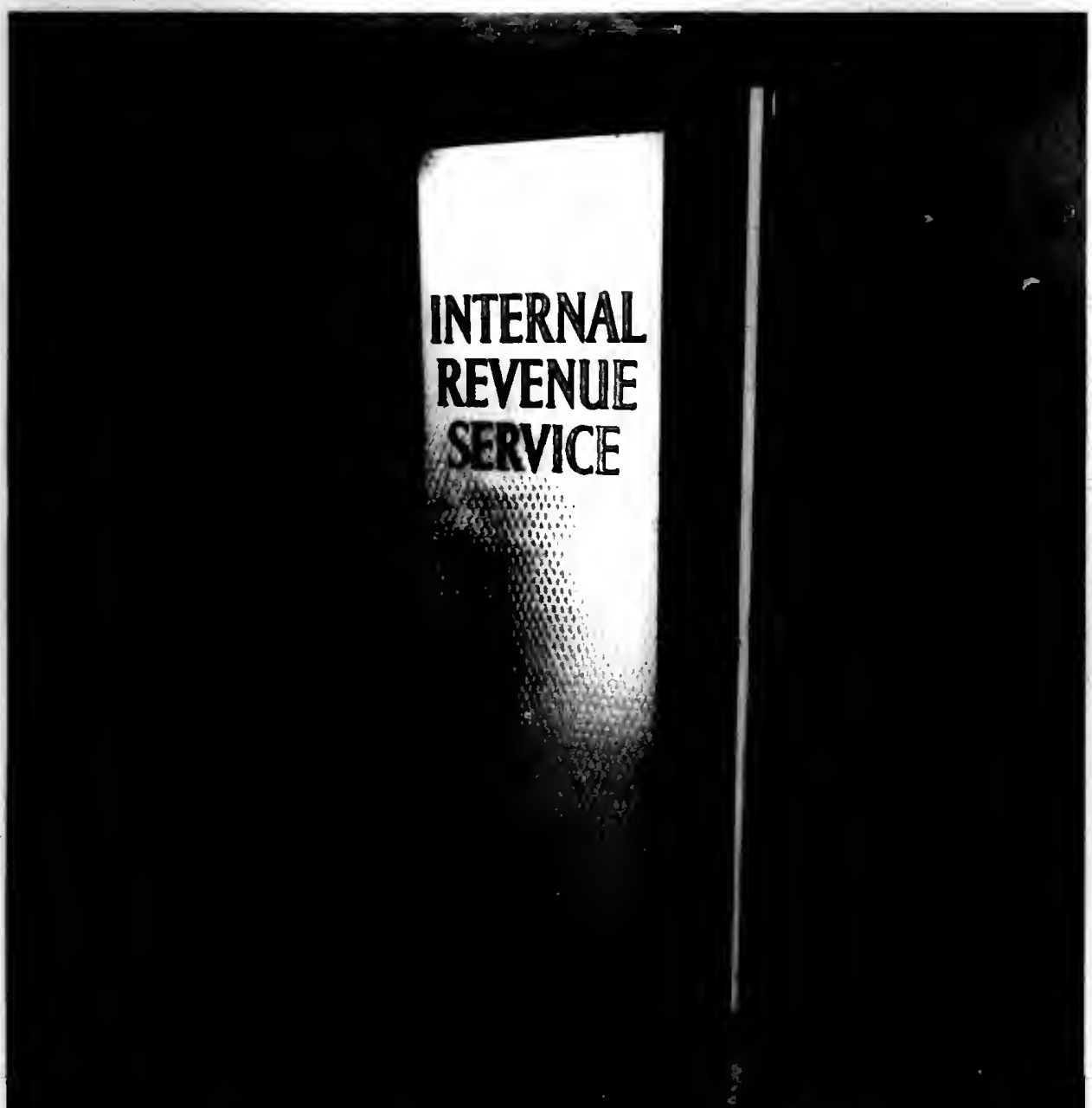

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